SELECTED WATER RESOURCES ABSTRACTS

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WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus** (November 1966 edition). Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

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Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency, Water Quality Office. A directory of the Centers appears on inside back cover.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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02 WATER CYCLE
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SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1A. Properties

GULF STREAM AND MIDDLE ATLANTIC BIGHT: COMPLEX THERMAL STRUCTURE AS SEEN FROM AN ENVIRONMENTAL SATELLITE,
National Oceanic and Atmospheric Administration, Hillcrest Heights, Md., National Environmental Satellite Service.
For primary bibliographic entry see Field 07B.
W71-11086

1B. Aqueous Solutions and Suspensions

CHEMISTRY OF NATURAL WATERS--1. FUNDAMENTAL RELATIONSHIPS,
National Inst. for Water Research, Durban (South Africa). Natal Regional Lab.
For primary bibliographic entry see Field 02K.
W71-11212

CORRELATION TIMES AND REORIENTATION ACTIVATION ENERGIES FOR TETRAALKYLAMMONIUM IONS IN AQUEOUS SOLUTIONS,
Missouri Univ., St. Louis. Dept. of Chemistry.
David W. Larsen.
Journal of Physical Chemistry, Vol 75, No 4, p 509-513, 1971. 5 p, 4 fig, 2 tab, 15 ref. OWRR Project A-022-MO (2).

Descriptors: *Water chemistry, *Aqueous solutions, *Ionization, *Activation energy, *Correlation analysis, Ammonium salts, Analytical techniques, Spectrometers, Instrumentation, Salts.
Identifiers: *Tetraalkylammonium.

Tetraalkylammonium Salts were prepared by allowing trimethylamine to react with the appropriate alkyl iodide in water solution over silver oxide for extended period of time. The solutions were then carefully filtered, neutralized with hydriodic acid, and evaporated to dryness. The salts were recrystallized before use. Aqueous solutions 0.05 M in tetraalkylammonium halide were prepared. Nmr spectra of the solutions were recorded using a Perkin-Elmer R-20 nmr spectrometer operating at 60 MHz. An average of 15 spectra were recorded for each sample to obtain optimum nmr line shapes for study. The spectra presented in report were fitted by comparison of appropriate line shape parameters (such as line width) with corresponding parameters from calculated line shapes. (Woodard-USGS)
W71-11319

SPECTROFLUORIMETRIC DETERMINATION OF TRACES OF FLUORIDE ION BY TERNARY COMPLEX FORMATION WITH ZIRCONIUM AND CALCEIN BLUE,
Imperial Coll. of Science and Technology, London (England). Dept of Chemistry.
For primary bibliographic entry see Field 05A.
W71-11567

02. WATER CYCLE

2A. General

AN EVALUATION OF A NUMERICAL WATER ELEVATION AND TIDAL CURRENT PREDICTION MODEL APPLIED TO MONTEREY BAY,
Naval Postgraduate School, Monterey, Calif.
Sheldon Mark Lazanoff.
Available from the National Technical Information Service as AD-722 562, $3.00 in paper copy, $0.95 in microfiche.

Descriptors: *Tides, *Mathematical models, *Forecasting, *Hydrodynamics, Ocean currents, Bays, Bathythermographs, Wind, Velocity.
Identifiers: Mathematical prediction, Ocean bottom, California, Bathythermograph data, Monterey Bay, Submarine Canyons.

The Hansen Hydrodynamical - Numerical model was evaluated for Monterey Bay with actual field data. Tides and winds are the principal driving forces of the Hansen model. Analysis of the field data indicated that the principal driving force of the circulation in the bay was the oceanic currents and not the tides and winds. The tidal heights and phases and current directions were calculated correctly by the model, but the calculated current speeds were an order of magnitude too large. The inaccuracy of the current speeds was attributed to the inaccurate calculations of the currents along the open boundary and the large bathymetric gradients of the Monterey Submarine Canyon.
W71-10988

THE INFLUENCE OF LAND MANAGEMENT AND SOIL CHARACTERISTICS ON INFILTRATION AND THE OCCURRENCE OF OVERLAND FLOW,
Bristol Univ. (England).
Rodney C. Hills.
Journal of Hydrology, Vol 13, No 2, p 163-181, June 1971. 19 p, 3 fig, 21 ref, append.

Descriptors: *Infiltration, *Overland flow, *Rainfall-runoff relationships, *Soil conservation, *Land management, Infiltrometers, Runoff, Water storage, Soil water movement, Percolation, Antecedent precipitation, Rainfall disposition.
Identifiers: *Infiltration capacity.

Infiltration capacity relates more closely to the treatment of a soil, especially the compaction of the surface layers, than to the natural soil characteristics. Overland flow may be studied with fluorescent dyes on low infiltration capacity sites with various soils and slopes. Relating infiltration measurements to local rainfall rates, after allowing for interception and surface storage, shows that at most only 30%, and on many sites fewer than 10%, of rainfalls can produce overland flow and then only on very restricted areas.
W71-11072

RESULTS OF RESEARCH ON SOME EXPERIMENTAL BASINS IN THE UPPER HARZ MOUNTAINS (FEDERAL REPUBLIC OF GERMANY),
Bundesanstalt fuer Gewasserkunde, Coblenz (West Germany).
H. Leibscher.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 163-176, 1970. 14 p, 13 fig.

Descriptors: *Rainfall-runoff relationships, *Clear-cutting, *Vegetation effects, Instrumentation, Stream gages, Data collections, Hydrologic data, Gaging stations, Climatology, Correlation analysis.
Identifiers: *Experimental watersheds, Harz Mountains (Germany).

Four experimental basins in the Upper Harz Mountains in the northern part of the Federal Republic of Germany are described. The main purpose of the watersheds is the investigation of the influence of forest on the runoff regime. Deforested and afforested areas are compared by trend analysis, autocorrelation, cross correlation and multiple regression. The mean annual depth of runoff is about 790 mm. The annual distribution of runoff is characterized by high runoff values for the winter months. The difference in runoff from the two areas increases with time. This is due to new growth in the Language Bramke area and to deforestation in the Wintertal area which began after 1960. Frequency distribution between the two areas does not reveal any significant differences. Simple correlation coefficients between monthly runoff and runoff of the preceding month, precipitation, precipitation of the preceding month, air temperature, air humidity, sum of solar radiation, and trend were calculated. All of the multiple-regression coefficients are higher than 0.98. After precipitation the mean annual air temperature exerts the greatest influence on runoff. (Knapp-USGS)
W71-11104

INFLUENCE OF FRACTURED ROCKS ON THE RECESSION CURVE IN LIMITED CATCHMENT AREAS IN HILL COUNTRY: A RESULT OF REGIONAL RESEARCH AND A FIRST EVALUATION OF RUNOFF AT HYDROGEOLOGICAL EXPERIMENTAL BASINS,
Bonn Univ. (West Germany). Institut fuer Geologie; and Geological Survey of North-Rhine-Westfalia (West Germany).
K. U. Weyer, and H. Karrenberg.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 177-191, 1970. 15 p, 11 fig, 2 tab, 10 ref.

Descriptors: *Regional analysis, *Rainfall-runoff relationships, *Fractures (Geology), *Structural geology, *Hydrogeology, Groundwater movement, Water yield, Recession curves, Surface-groundwater relationships, Base flow.
Identifiers: *Germany, *Experimental watersheds.

Runoff from drainage systems was measured in more than 1000 small catchment areas of the Rheinisches Schiefergebirge and hilly parts of Muensterland, Germany. These catchment areas have different underground geological structure. Correlation analyses were made of the relation of regional distribution of low flow discharge and geological underground structure. A new type of hydrogeological station was developed to check runoff, precipitation, and evaporation in 'elementary watersheds'. In this way the hydrological cycle can be observed in different types of fractured rocks. After each rainfall the modification of groundwater balance is calculated from the base flow by two similar mathematical methods. Water yields are mostly dependent on the joint space of the rocks, and this space is in turn dependent on the geologic structure. (Knapp-USGS)
W71-11105

A PRELIMINARY STUDY OF THE WATER BALANCE OF A SMALL CLAY CATCHMENT,
Hydrological Research Unit, Wallingford (England).
K. A. Edwards, and J. C. Rodda.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 202-218, 1970. 17 p, 7 fig, 34 ref.

Descriptors: *Water balance, *Data collections, *Small watersheds, *Rainfall-runoff relationships, *Data processing, Computer programs, Evapotranspiration, Stream gages, Rain gages, Temperature, Discharge (Water), Stage-discharge relations.
Identifiers: *Experimental watersheds, River Ray (U. K.).

The catchment research undertaken on the River Ray, Buckinghamshire, U. K., is described in detail. Results from the investigation are presented in the form of a water balance. The data system consists of three distinct stages: firstly, the raw data on cards are submitted to a simple accounting procedure which checks for and locates punching errors and spurious values. Secondly, the corrected data are assembled by computer on magnetic tape to enable large quantities of data to be handled in a single run. This tape is employed in subsequent calculations of mean basin rainfall, potential evapora-

tion and discharge. Finally, the computed data are assembled chronologically on a final tape, which can be used in water-balance and mathematical-model work. Mean basin rainfall is obtained from the daily standard-gage total together with the adjusted hourly amounts from chart recorders. Stream discharge is calculated from stage records. Total daily flows and instantaneous discharge are computed at intervals dependent upon the rate of change of the hydrograph. Potential evaporation and transpiration are calculated on a daily basis from the combination of bulk aerodynamic and heat-budget techniques after the method of Penman. In this study of a physically simple catchment, systematic errors in water balance calculations arise from the use of the Penman formula to estimate potential evaporation. These errors could be as much as 100 mm (4 in.) in the estimation of water use between the months of March and September. These errors arise in part from the omission of a soil heat storage term.
W71-11106

FLUVIAL DIFFERENTIATION OF THE BASIN OF LAKE VICTORIA,
Makerere Univ. Coll., Kampala (Uganda). Dept. of Geography.
For primary bibliographic entry see Field 02J.
W71-11107

EFFECTS OF VARIABLE INTENSITY OF RAINFALL ON RUNOFF IN THE NORTHERN CAUCASUS (O neravnomernosti khoda livney na Severnom Kavkaze),
Gidrometeorologicheskii Institut, Odessa (USSR).
L. I. Semenenko.
Meteorologiya, Klimatologiya i Gidrologiya, No 6, p 172-177, 1970. 2 fig, 1 tab, 6 ref.

Descriptors: *Rainfall, *Precipitation (Atmospheric), *Runoff, *Rainfall-runoff relationships, Gaging stations, Hydrographs, Flood routing, Probability, Orography, Antecedent precipitation.
Identifiers: *USSR, *Caucasus, Black Sea, Krasnodar, Ordzhonikidze, Asymmetry coefficient.

Coefficients of asymmetry, defined as the ratios of the time required for precipitation to reach its maximum to the total duration of precipitation, were computed for 22 gaging stations in the Northern Caucasus. The stations were divided into 7 groups based on climatic and physico-geographic characteristics of the area and on station altitude. A total of 887 rainfall periods, representing a precipitation of 20 mm of more over a 30-year period (1936-1966), were included in the computations. The coefficient of asymmetry of 25% probability changed in a southeast direction from 0.55 near Krasnodar to 0.58 at Ordzhonikidze. The coefficient of asymmetry was 0.66-0.70 in high altitudes (about 1.5 km) on the Black Sea coast. The asymmetry coefficient of 50% probability varied between 0.29 and 0.38 and increased to 0.47 only in the region of the Dzhugba-Goytkh station. Adjustments for the effects of asymmetry increase the reliability of the calculations of maximum runoff. By knowing the value of the asymmetry coefficient it is possible to define an inflow hydrograph and, by applying flood routing techniques, to define a hydrograph of runoff from small, poorly gaged basins. (Josefson-USGS)
W71-11322

MOISTURE REGIME OF THE WEST SIBERIAN PLAIN (Uvlazhnennost' Zapadno-Sibirskoy ravniny),
V. S. Mezentsev, and I. V. Karnatsevich.
Leningrad, Gidrometeoizdat, 1969. 168 p.

Descriptors: *Hydrologic cycle, *Hydrologic budget, *Water balance, *Heat balance, *Moisture content, Soil moisture, Water supply, Precipitation (Atmospheric), Runoff, Moisture deficit, Hydrologic data, Meteorological data, Evapotranspiration, Soil properties, Humidity, Wet seasons, Seasonal, Data processing, Computers, Equations.
Identifiers: *USSR, *West Siberian Plain, Water regime, Moisture regime, Heat regime, Regionalization, Growing season.

The water and heat regimes of the West Siberian Plain are examined in connection with planning rational use of productive resources and implementing efficient water management and reclamation practices. Particular attention is paid to the quantitative and qualitative aspects of the water and heat balances of the lowland and to a hydrologic-climatic regionalization of the area. This monograph is designed for hydrologists, climatologists, soil scientists, geographers and other specialists engaged in a study of the hydrologic and heat budget, runoff, evapotranspiration and soil moisture of Siberian lands. (Josefson-USGS)
W71-11332

RUNOFF AND WATER BALANCE OF RIVER BASINS OF THE KIRGHIZ SSR (Stok i vodnyy balans rechnykh basseynov Kirgizii),
Sredneazyatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkend (USSR).
For primary bibliographic entry see Field 02E.
W71-11333

2B. Precipitation

CHARACTERISTICS OF INTENSE RAINFALL IN WEST VIRGINIA,
West Virginia Univ., Morgantown.
Roy Everett Trent, Jr.
PhD Thesis, West Virginia University, 1970. 117 p, 18 fig, 13 tab, 54 ref, 2 append. OWRR Project A-019-WVA (1).

Descriptors: *Rainfall, *Rainfall intensity, *Rainfall disposition, *West Virginia, Distribution patterns, Mathematical studies, Mathematical models, Rain gages, Hydrologic data, Date collections.
Identifiers: *Rainfall characteristics.

The characteristics of intense rainfall in West Virginia are described. Hourly precipitation data from 22 Weather Bureau Stations were evaluated to determine the most suitable frequency distribution of intensity-duration relations for rainfalls of 1-, 2-, 3-, 6-, 12-, and 24-hour durations; the seasonal and diurnal variations in the occurrence of intense rainfall; and the occurrence of rainfall, antecedent to intense rainfall events. Summer was the season of maximum frequency of occurrence of intense rainfall. Late afternoon was the time of maximum frequency for short duration storms (1 to 6 hours), and early morning was the time of maximum frequency for longer duration storms (12 to 24 hours). July and August were the months of most frequent occurrences of large 5-day antecedent rainfall. (Woodard-USGS)
W71-11113

A CUMULUS CONVECTION MODEL APPLIED TO THUNDERSTORM RAINFALL IN ARID REGIONS,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
D. L. Morgan.
Army Corps of Engineers, Hydrologic Engineering Center Research Note No 1, December 1970. 24 p, 8 fig, 2 tab, 24 ref.

Descriptors: *Rainfall, *Cloud physics, *Mathematical models, *Convection, *Arid lands, Flash floods, Rainfall-runoff relationships, Meteorology, Atmospheric physics, Precipitation (Atmospheric), Storm structure, Thunderstorms, Model studies.
Identifiers: Convection (Atmospheric).

Rainfall estimates from a computer model for cumulus convection were compared to measured precipitation. The estimates of amount and duration of rainfall compared favorably with data from dense rain gage networks in Arizona and New Mexico for most of the thunderstorm cases examined. Systematic differences are attributed to the inability of the model to replicate complex atmospheric processes completely, nonrepresentativeness of input data, and to difficulties in assessing fully the ground truth precipitation.
W71-11129

DISTRIBUTION OF HOURLY PRECIPITATION IN ILLINOIS,
Illinois State Water Survey, Urbana.
Floyd A. Huff.
Illinois Water Survey Circular 105, 1971. 23 p, 10 fig, 3 tab, 11 ref.

Descriptors: *Precipitation (Atmospheric), *Rainfall disposition, *Distribution patterns, *Illinois, *Precipitation intensity, Statistics, Data collections, Meteorolological data, Synoptic analysis, Regional analysis, Climatic data, Hydrologic data.
Identifiers: Hourly precipitation distribution (Ill).

A study was made of the annual, seasonal, geographic, and diurnal distribution of hourly precipitation in Illinois. It was found that the maximum number of rainy hours occurs in spring, except in the extreme southern part of the state where winter dominates. The minimum frequency changes gradually from fall to summer from the northern to the southern part of the state. Annually, extreme southern Illinois is the wettest region of the state, based on the frequency of hours with measurable precipitation. With respect to precipitation intensity, hourly amounts in the range from 0.01 to 0.10 inch predominate in all seasons and account for over 80% of the annual occurrences in the state. Light precipitation (0.01-0.10 inch per hour) accounts for most of the precipitation throughout the state, regardless of time of day. However, light precipitation is most dominant in late forenoon and early afternoon. The great skewness in the occurrence of severe rainstorms suggests that exposure of existing convective systems to both the daytime heating and nocturnal intensifying mechanisms may be a major cause of the preponderance of night and early morning maximums in these storms. (Knapp-USGS)
W71-11136

EFFECTS OF VARIABLE INTENSITY OF RAINFALL ON RUNOFF IN THE NORTHERN CAUCASUS (O neravnomernosti khoda livney na Severnom Kavkaze),
Gidrometeorologicheskii Institut, Odessa (USSR).
For primary bibliographic entry see Field 02A.
W71-11322

CHANGES IN HYDROMETEOROLOGICAL PHENOMENA ON THE ODESSA COAST (O zakonomernostyakh izmeniya nekotorykh gidrometeorologicheskikh yavleniy na Odesskom poberezh'ye),
Odessa State Univ. (USSR).
Yu. G. Balandin, and L. Ye Zinov'yeva.
Meteorologiya, Klimatologiya i Gidrologiya, No 6, p 166-171, 1970. 1 fig, 1 tab, 5 ref.

Descriptors: *Correlation analysis, *Solar radiation, *Precipitation (Atmospheric), *Discharge (Water), *Water levels, Meteorological data, Climatic data, Estuaries, Forecasting, Frequency.
Identifiers: *USSR, Odessa, Black Sea, Kuyal'nitskiy estuary, Solar activity.

All changes in climatic conditions and water discharges, despite their geozonal peculiarities, may be reduced to two types: (1) changes associated with a gradual change in the temperature of the sun and of the earth and (2) fluctuations associated with irregular short-term changes in solar activity. A study was made of the variations in annual precipitation totals for Odessa from 1843 through 1967 and of fluctuations in the level of the Kuyal'nitskiy estuary and Black Sea near Odessa for the periods 1860-1967 and 1875-1967, respectively. The correlation coefficient computed for the duration of the periods between the solar activity

maxima and the maximum levels of the Kuyal'nitskiy estuary was 0.69; the correlation coefficient between the maximum levels of the Kuyal'nitskiy estuary and the maximum annual precipitation totals was 0.84; the correlation coefficient between the maximum levels of the Kuyal'nitskiy estuary and those of the Black Sea near Odessa was 0.81. The values of the correlation coefficients attest to the close relationship between these hydrometeorological phenomena and solar activity. (Josefson-USGS)
W71-11323

HORIZONTAL MOISTURE TRANSPORT AND THE MOISTURE REGIME IN THE UKRAINE IN THE SUMMER OF 1964-65 (Gorizontal'nyy perenos vlagi i rezhim uvlazhneniya na Ukraine leton 1964-1965 g.),
Gidrometeorologicheskii Institut, Odessa (USSR).
A. A. Vrublevskaya.
Meteorologiya, Klimatologiya i Gidrologiya, No 6, p 106-109, 1970. 1 tab, 6 ref.

Descriptors: *Moisture content, *Water balance, *Atmosphere, *Precipitation (Atmospheric), Water vapor, Air circulation, Air masses, Synoptic analysis, Evaporation, Seasonal.
Identifiers: *USSR, Ukraine, Moisture transport.

A study was made of the moisture regime of the Ukraine in the summer of 1964-65 to determine fluctuations in the water balance of the atmosphere. The western and eastern components of moisture transport were major contributors to the total water balance of the atmosphere over the Ukraine. A direct relationship was observed between the horizontal transport of moisture in the atmosphere and the moisture regime of the area. A combination of favorable circulation conditions and a high moisture content in the air masses in July and August 1965 contributed to high moisture contents for the Ukraine during this period. The total moisture transport in July was plus 6.7 billion g/sec, which was equivalent to a precipitation of 31 mm a month, and in August the total moisture transport was 4.11 billion g/sec or 19 mm of precipitation per month. (Josefson-USGS)
W71-11326

MOISTURE REGIME OF THE WEST SIBERIAN PLAIN (Uvlazhnennost' Zapadno-Sibirskoy ravniny),
For primary bibliographic entry see Field 02A.
W71-11332

PROBABILITIES OF OBSERVED DROUGHTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W71-11345

POTENTIAL METHODS OF INDEXING DIURNAL WEATHER OBSERVATIONS,
Wyoming Univ., Laramie. Natural Resources Research Inst.
For primary bibliographic entry see Field 07C.
W71-11363

STORMS AND METEROLOGY OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program and National Oceanic and Atmospheric Administration, Silver Spring, Md.
For primary bibliographic entry see Field 02L.
W71-11475

2C. Snow, Ice, and Frost

FLOW LAW FOR ANTARCTIC ICE SHELVES,
Scott Polar Research Inst., Cambridge (England).
R. H. Thomas.
Nature Physical Science, Vol 232, No 30, p 85-86, July 26, 1971. 2 p, 3 fig, 17 ref.

Descriptors: *Icebergs, *Glaciers, *Sea ice, Movement, Melting, Glaciation, Oceans, Mathematical studies, Equations, Analytical techniques.

Ice shelves are floating glaciers which are attached to an inland ice sheet or to land. They creep under their own weight, the creep rates being dependent on the ice flow law at low stresses. Particularly at low stresses, however, it is difficult to distinguish steady-state creep from transient creep. True steady-state creep rates can best be deduced by applying transient-creep theory to the observed creep-time curve. At Maudheim no trend towards a preferred orientation was found down to a depth of 100 m. But at Little America on the Ross Ice Shelf, Gow reported a gradual migration of c-axes towards the vertical. At 116 m depth 75% of the c-axes was oriented within 35 deg of the vertical. At greater depths the c-axes clustered in three or four maxima symmetrically situated generally within 25 deg of the vertical. This could represent a state of equilibrium between the simultaneous effects of both dynamic recrystallization and grain tilting. (Woodard-USGS)
W71-11081

GROUND ICE AND PSEUDOTECTONIC DEFORMATIONS OF LITTORAL DEPOSITS, AS ILLUSTRATED BY THE SANCHUGOVSKO-KAZANTSEVSKIYE DEPOSITS OF NORTHWESTERN SIBERIA (Podzemnyye l'dy i sanchugovsko-kazantsevskikh tolshch severa Zapadnoy Sibiri),
Leningrad State Univ. (USSR).
V. A. Usov.
Leningradskiy Gosudarstvennyy Universitet Vestnik No 24, Seriya Geologiya i Geografiya, No 4, p 148-152, December 1970. 5 p, 8 ref.

Descriptors: *Ice, *Frozen ground, *Structural geology, *Permafrost, *Deltas, Geologic investigations, Engineering geology, Geologic time, Glacial drift, Cryology, Folds (Geology), Quaternary period, Littoral, Deformation, Sediments.
Identifiers: *USSR, *Tectonics, Krasnoyarsk Kray, Yenisey River, Yenisey Bay, Ice lenses, Paleogeography.

The cryogenic structure of perennially frozen Quaternary deposits in Western Siberia is examined in connection with recently expanded geological and engineering-geological investigations of the area as a result of the discovery of gas. The Sanchugovsko-Kazantsevskiye deposits, a complex geologic structure in northwestern Siberia, were formed in the final stage of boreal transgression. The deposits are characterized by thick (15-20 m) layers of fossil ice in the upper parts of the loam horizon and, in some outcrops, by traces of atypical fold formations. These characteristics are peculiar to deposits formed on the deltaic shores of the Yenisey River and Yenisey Bay. The author's hypothesis (1967) of the subaqueous origin of the thick ice bodies is reaffirmed. (Josefson-USGS)
W71-11117

SEASONAL FREEZING AND ITS EFFECT ON THE GENESIS AND FERTILITY OF SIBERIAN SOILS (Sezonnaya merzlota i yeye vliyaniye na genezis i plodorodiye pochv Sibiri),
Institute of Forestry and Timer, Krasnoyarsk (USSR).
N. V. Orlovskiy.
Pochvovedeniye, No 10, p 3-13, October 1970. 11 p, 4 fig, 31 ref.

Descriptors: *Freezing, *Frost action, *Permafrost, *Frozen soils, *Fertility, Cold regions, Seasonal, Salt balance, Water balance, Cryology, Land reclamation, On-site investigations, Soil structure, Soil properties, Soil moisture, Thawing, Drainage practices, Fertilizers, Nutrients, Crop production.
Identifiers: *USSR, *Siberia, Altay Kray, Krasnoyarsk Kray, Yakutsk ASSR, Maritime Territory, Water erosion, Soil genesis, Soil geography.

Frost action phenomena and their effect on various soil properties are examined on the basis of the literature and of field investigations conducted in the Baraba Steppe, Altay and Krasnoyarsk Krays, Transbaykal, Yakutsk ASSR, and the Maritime Territory. The importance of prolonged seasonal freezing to the water, salt, and nutrient regime of the soils is considered in connection with the specific agricultural and reclamation practices employed in southern Siberia. Relict forms of permafrost, indicative of its recent widespread distribution over vast expanses of the Kulunda, Aleysk and Kansk Steppes, are found to be the principal cause of the spottiness of the present-day soil. (Josefson-USGS)
W71-11122

PERMAFROST STUDIES OUTSIDE THE USSR UNTIL 1955, A LITERATURE REVIEW,
A. M. Chekotillo.
Transl. from Akad, Nauk SSSR Inst. Merzlotovedeniya Materialy k Ucheniyu o Merzlykh Zonakh Zemnoy Kory, No 3, p186-198, 1956. Available from Nat Tech Inf Service as AD-718 885. SIPRE Translation 61, October 1958. 20 p, 1 tab, 180 ref.

Descriptors: *Permafrost, *Reviews, *Bibliographies, Frozen soils, Frozen ground, Ice, Freezing, Thawing, Engineering geology.

Studies on permafrost outside the USSR before 1955 are briefly reviewed. A selective bibliography of North American work is presented. The USSR and the U.S.A. are the only countries where the study of permafrost has developed and plays an important part in solving many engineering problems. Canada, with its vast areas of permafrost, has done very little research on permafrost and holds second place in relation to the U.S.A. (Knapp-USGS)
W71-11142

TRANSITION METAL BINDING BY LARGE MOLECULES IN HIGH LATITUDE WATERS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W71-11247

1971 PILOT STUDIES--REMOTE SENSING AND ICE MORPHOLOGY.
Washington Univ., Seattle Div. of Marine Resources.
For primary bibliographic entry see Field 07B.
W71-11355

2D. Evaporation and Transpiration

COMPARATIVE WATER LOSS OF DOUGLAS-FIR AND OREGON WHITE OAK,
Oregon State Univ., Corvallis. Water Resources Research Inst.
James T. Krygier.
Available from the National Technical Information Service as PB-202 010, $3.00 in paper copy, $0.95 in microfiche. Oregon State University Water Resources Research Institute and School of Forestry Project Completion Report, April 1971. 137 p, 29 fig, 26 tab, 110 ref. OWRR Project A-001-ORE (9).

Descriptors: *Evapotranspiration, *Consumptive use, *Water loss, *Soil-water-plant relationships, *Forests, Oak trees, Douglas Fir trees, Rainfall disposition, Evaporation, Transpiration, Water balance, Interception, Water yield, Drainage, Runoff.

A water budget was determined for pure, fully stocked stands of Douglas-fir and Oregon white oak. Plots were irrigated one summer to measure water loss when water was freely available--an attempt to simulate potential conditions. A plastic roof was constructed under the canopy of each of the stands and a plastic barrier installed in the soil

to permit early spring and winter measurements for one year. Measurements consisted of gross precipitation in openings, throughfall, and soil-water change. Interception storage was determined to be .02 inches for oak in a leafless condition, .10 inches when in leaf, .13 inches for Douglas-fir in winter, and .20 inches in summer. The disposition of average annual precipitation (1965 and 1966) to interception loss is 21 percent for Douglas-fir and 7.5 percent for Oregon white oak, eight and three inches, respectively. Computed hydraulic gradients indicate downward water movement in the oak soil profile for a longer period in the spring months. Extraction took place only in surface soil layers of the oak stand before leafing. There are seasonal differences in evapotranspiration for the two species but from time of leafing to time of leaf fall of oak there is no substantial difference. When water was freely available, after irrigation, there was no difference in evapotranspiration. (Knapp-USGS)
W71-11063

2E. Streamflow and Runoff

A MODEL FOR SURFACE DRAINAGE OF CULTIVATED FIELDS,
Technion - Israel Inst. of Tech., Haifa. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 04A.
W71-11070

THE INFLUENCE OF LAND MANAGEMENT AND SOIL CHARACTERISTICS ON INFILTRATION AND THE OCCURRENCE OF OVERLAND FLOW,
Bristol Univ. (England).
For primary bibliographic entry see Field 02A.
W71-11072

TESTS ON CYLINDERS IN TURBULENT FLOW,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
Walter H. Graf, and Stephen C. Ko.
Journal of the Hydraulics Division, ASCE Proceedings, Vol 97, No HY8, p 1265-1267, August 1971. 3 p, 1 fig, 1 tab, 1 ref.

Descriptors: *Turbulent flow, *Fluid friction, *Flow resistance, *Pressure drag, Shear drag, Reynolds number, Turbulence, Hydraulics, Boundary layers, Dimensional analysis.
Identifiers: Hydraulic drag.

An experimental investigation to study the effect of turbulence on the drag coefficient of cylinders was conducted in a 5-in. air duct. Two 3-in. long smooth circular cylinders had diameters of 1/4 in. and 1/2 in. The range of Reynolds numbers over which the experiments were performed was 1,300 to 8,000. Turbulence intensity, and to a lesser degree the turbulence scale, affect the results systematically. At low turbulence intensities, the drag coefficients are below the standard drag coefficient versus R curve. However, at high turbulence intensities, the drag coefficients are above the standard curve. These observations suggest that (1) the turbulence intensity exerts a noticeable influence upon the drag coefficient, while (2) the effects of the Reynolds numbers and the turbulence scales are less pronounced. (Knapp-USGS)
W71-11079

THE EFFECT OF WIND AND SOLAR RADIATION UPON THE OCEAN (NATURE OF THE PERU CURRENT),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
V. S. Samoylenko.
Oceanology, Vol 10, No 1, p 1-12, 1970. 12 p, 8 fig, 8 ref.

Descriptors: *Ocean currents, *Pacific Ocean, *Ocean circulation, Water circulation, Water temperature, Meteorology, Climatology, Oceanography, Currents (Water), Winds, Advection, Evaporation.
Identifiers: Upwelling (Ocean water), Chilean-Peruvian current.

The interaction of the ocean with the atmosphere is nowhere as vividly displayed as in the nature of anomalously cold ocean currents at tropical latitudes. The nature of the Chilean-Peruvian current off the South American coast is examined. The temperature of this current is 10 C deg lower than that of the open ocean at the same latitudes. It is established that the causes of this unusual phenomena are purely meteorological. The temperature of the Peru current is 8-10 C deg lower than the equilibrium temperature corresponding to radiational and turbulent heat exchange with the atmosphere. These computations indicate strong advection of cold water, bringing a heat loss of 40 kcal/sq cm year. This strong advection of cold water creates the maximum (for the Pacific Ocean) divergence of the wind field observed in this region. The S or SSW winds, paralleling the coast create constant lateral upwelling and a maximum divergence of the field of oceanic surface currents, forcing the cold deep water to rise slowly, but constantly, to the ocean surface. All other cold tropical currents of the World Ocean are probably of the same nature.
W71-11090

HEAT TRANSFER BY CURRENTS IN THE NORTH ATLANTIC,
Gidrometeorologicheskii Institut, Leningrad (USSR).
A. I. Smirnova.
Oceanology, Vol 10, No 1, p 21-27, 1970. 7 p, 1 fig, 12 ref.

Descriptors: *Heat transfer, *Advection, *Ocean circulation, *Ocean currents, *Water temperature, Solar radiation, Heat balance, Currents (Water), Oceanography, Evaporation, Atlantic Ocean, Mixing.
Identifiers: Advective heat transfer.

Advective heat transfer is computed from temperature distribution and current velocities. A preliminary estimate may be made of the terms of the heat balance equation in water. The temperature and current velocity fields are obtained from long-period mean data. Maps of the distribution of average seasonal advection values in the North Atlantic are presented. In the absence of data on vertical temperature and salinity distribution, advective heat transfer is most frequently estimated by indirect quantitative methods, based on the analysis of more general heat balance equations. Advection was computed in the active layer of the North Atlantic for rectangles 5 deg in latitude by 5 deg in longitude. The depth of the active layer in the North Atlantic was assumed to be constant and equal to 200 m in the first approximation. To compute the advective heat flux the temperature and current velocity fields were determined from maps of total transport. Average flow over a small time interval was approximately represented as the sum of average densities and of average wind circulation. The most interesting redistribution of heat by currents is observed in winter, when the conditions of radiational heating and the intensity of atmospheric circulation differ at low and high latitudes. There is outflow of heat at low latitudes, while in the areas of the Gulf Stream and of the North Atlantic current there is mainly an inflow of heat due to advection. The heat transfer by currents is somewhat less intense in spring and autumn than it is in winter. (Knapp-USGS)
W71-11091

WATER CIRCULATION IN THE EASTERN SOUTH ATLANTIC OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
K. V. Moroshkin, V. A. Bubnov, and R. P. Bulatov.
Oceanology, Vol 10, No 1, p 27-34, 1970. 8 p, 4 fig, 13 ref.

Descriptors: *Atlantic Ocean, *Oceanography, *Ocean circulation, *Ocean currents, *Meteorology, Winds, Currents (Water), Water circulation, Water temperature, Climatology, Advection, Eddies, Productivity, Velocity, Synoptic analysis, Surveys.
Identifiers: Benguela current.

The water circulation and the enhanced biological productivity in the eastern parts of tropical oceans are cyclonic in nature. A detailed hydrological survey with long-term observations at buoy stations in the South Atlantic Ocean established the existence of a large-scale tropical cyclonic gyre extending from 10-20 to 300 m beneath a very thin wind-driven surface current. Its northern boundary is the south equatorial countercurrent, from 5 to 9 deg S with velocities of 30-50 cm/sec, which passes along the African coast into the Angola current with maximum velocities of 50 cm/sec below the surface from 9 to 16 deg S. The Benguela current turns westward south of the survey region, is 200 to 300 miles wide, and has maximum velocities up to 15-20 cm/sec. The three streams of the Benguela current proceed northward along the shore and reach 13-14 deg S. The interaction of the second northern stream of the Benguela current with the Angola current forms a divergence region along 11 deg E from 17 deg to 13 deg S. A quasistationary anticyclonic eddy extending to 100-m depths, centered at 7 deg 30 min S and 9 deg 30 min E is found southwest of the mouth of the Congo River.
W71-11092

HYDROLOGICAL EFFECTS OF CULTURAL CHANGES AT MOUTERE EXPERIMENTAL BASIN,
Ministry of Works, Nelson (New Zealand). Water and Soil Div.
For primary bibliographic entry see Field 04C.
W71-11103

FLUVIAL DIFFERENTIATION OF THE BASIN OF LAKE VICTORIA,
Makerere Univ. Coll., Kampala (Uganda). Dept. of Geography.
For primary bibliographic entry see Field 02J.
W71-11107

ANALYSIS OF CURRENT-METER DATA AT COLUMBIA RIVER GAGING STATIONS, WASHINGTON AND OREGON,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07B.
W71-11108

CURRENTS AND WATER EXCHANGE IN DNESTROVSKIY LIMAN,
For primary bibliographic entry see Field 02L.
W71-11111

PROBABILITY OF LEVEE BREAKS DUE TO HEAVY RAINFALLS IN A RIVER,
Kyoto Univ. (Japan) Disaster Prevention Research Inst.
For primary bibliographic entry see Field 06A.
W71-11130

EVALUATION OF STREAMFLOW-DATA PROGRAM IN FLORIDA,
Geological Survey, Tallahassee, Fla.
James W. Rabon.
Geological Survey Open-file Report 70008, 1971. 70 p, 2 fig, 5 tab, 8 ref, 2 append.

Descriptors: *Streamflow, *Hydrologic data, *Data collections, *Florida, Reviews, Hydrology, Floods, Natural flow, Regulated flow, Watersheds (Basins), Stream gages, Gaging stations, Network design, Project planning, Regression analysis, River forecasting.

The results of an evaluation of the streamflow data network in Florida as part of a nationwide appraisal

by the U.S. Geological Survey during fiscal year 1970 are presented. The purpose was to make a statistical evaluation of the streamflow data program and to apply the results in the design of the future data program. Basic steps were (1) definition of the long-term program goals in quantitative terms, (2) examination and evaluation of all available data to determine its adequacy for meeting the goals, and (3) consideration of alternate methods of data collection or analyses for reaching unmet goals. Streamflow information was considered in four categories: (1) data for current use, (2) data for planning and design, (3) data on long-term trends, and (4) data on stream environment. Goals for each category and methods of providing data for reaching these goals are described. Regression equations were developed to determine the flow characteristics within specific accuracy goals for any point on natural flow streams in Florida. (Woodard-USGS)
W71-11132

GROUNDWATER IN THE WAIANAE DISTRICT, OAHU, HAWAII,
Geological Survey, Washington, D.C.
Kayoshi J. Takasaki.
For sale by the U.S. Geological Survey, Washington, D.C. 20242--Price $1.50 per set. Geological Survey Hydrologic Investigations Atlas HA-358, 2 sheets, 1971. Text, 6 fig, 4 map, 3 tab, 9 ref.

Descriptors: *Water resources development, *Hawaii, *Aquifers, *Hydrogeology, *Evapotranspiration, Phreatophytes, Water levels, Groundwater movement, Water yield, Water utilization, Basalts, Water wells.
Identifiers: Waianae (Hawaii).

The principal groundwater reservoir in the Waianae District, Oahu, Hawaii, is the Waianae Volcanic Series. Groundwater movement within the reservoir is partly controlled by dikes and breccia. The largest user of groundwater in the area at the present time is a phreatophytic growth called kiawe. Future development of the groundwater reservoir by man depends, in large part, on depriving the extensive kiawe growth from using the groundwater in the intermontane valleys. Aside from that part of rainfall that runs off to sea as overland flow during infrequent heavy storms, nearly all water in the District is discharged by tunnels, springs, wells, and evapotranspiration. Discharge to sea as underflow is probably negligible as groundwater at shallow depths near the coast has a high chloride content. Most recharge takes place where rainfall is highest in volcanic terrane in the interior mountains, and most discharge takes place where rainfall is lowest in coralline terrane near the coast. Most water is evaporated and transpired in low-lying areas, where groundwater levels are shallow and kiawe grows luxuriantly. Heavy pumping would not lower water levels sufficiently to deprive the kiawe of water, and evapotranspiration would remain about the same. The most promising areas for groundwater development are in the deeper valleys in the mountains. (Knapp-USGS)
W71-11143

APPLICATION OF AN ACOUSTIC STREAMFLOW-MEASURING SYSTEM ON THE COLUMBIA RIVER AT THE DALLES, OREGON,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07B.
W71-11151

EFFECT OF LOW-FLOW HYDROLOGIC REGIMES ON WATER QUALITY MANAGEMENT,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 05G.
W71-11201

THE SYNTHESIS OF FLOWS IN NORTH CAROLINA STREAMS FOR COMPUTER SIMULATION EXPERIMENTS,
North Carolina Water Resources Research Inst., Raleigh.
David H. Moreau.
Available from the National Technical Information Service as PB-202 012, $3.00 in paper copy, $0.95 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Report UNC-WRRI-71-50, Apr 1971, 112 p, 51 fig, 21 tab, 10 ref, 5 append. OWRR Project A-043-NC (2).

Descriptors: *Computer models, Hydrologic data, *Synthetic hydrology, *Time series analysis, *Sequential generation, *Statistical models, *Model studies, *Streamflow, *Simulation analysis, Flow, North Carolina, Streams.

Except in special cases, multivariate streamflow models developed in the past have been restricted to the preservation of first and second moments of historical streamflow frequency distributions, relying on the use of arbitrary nomalizing transformations to apply the models to those frequently encountered instances where special cases are not applicable. This work extends those models to preserve third moments in generated records of monthly flows, thus avoiding the use of arbitrary transformations. The precision and accuracy with which system performance can be modelled is dependent on the choice of averaging intervals for streamflow sequences. While some systems may be adequately described using monthly averaging intervals, extreme events such as floods and low flows are generally measured over shorter time intervals, namely, days and weeks. However, the use of shorter intervals will likely lead to extraneous detail during much of the simulation, create problems of data storage, and increase computational expense significantly. Methods are reported here to either assign probabilities to the occurrence of extreme events of sub-month duration or to generate observations on maximum or minimum sub-month flows. Methods are then presented to superimpose daily and weekly sequences on monthly flows only as they may be required for system simulation. Empirical work is based on streams in North Carolina and other selected gages in the eastern and southeastern sections of the United States. (Howells-North Carolina State)
W71-11202

METHODS EMPLOYED IN STUDYING THE MIXING MECHANISM AT THE CONFLUENCE OF THE BROAD AND SALUDA RIVERS, COLUMBIA, SOUTH CAROLINA,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 02J.
W71-11222

FLOODS OF NOVEMBER 1965 TO JANUARY 1966 IN THE GILA RIVER BASIN, ARIZONA AND NEW MEXICO, AND ADJACENT BASINS IN ARIZONA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04A.
W71-11251

FLOOD ROUTING IN THE JAMES RIVER,
Virginia Polytechnic Inst., Blacksburg. Dept. of Civil Engineering.
Dinshaw Contractor, and James M. Wiggert.
Paper presented at 52nd Annual Meeting of the American Geophysical Union, April 12-16, 1971, Washington, D.C. 38 p, 24 fig, 5 tab, 1 ref. OWRR Project A-036-VA (1).

Descriptors: *Floods, *Computer models, *Simulation analysis, *Virginia, *Flood routing, Hydrograph analysis, Numerical analysis, Routing, Computer programs, Digital computers, Hydrographs, Flood routing, Streamflow forecasting.
Identifiers: Inplicit method, James River (Va).

A computer program was developed to compute the flows in the James River, Virginia, at 22 locations along its length. The program uses the implicit method of solution of the partial differential equations of continuity and motion. As far as is practicable, cross-section data of the river is used in the appropriated terms in the formulation of the solution. Provision for the introduction of tributary flows-both gaged and ungaged-is made, and the effect of operation of existing dams on the river is introduced into the program. (See also W71-11318) (Knapp-USGS)
W71-11317

A COMPUTER MODEL OF FLOOD FLOWS IN THE JAMES RIVER,
Virginia Polytechnic Inst., Blacksburg. Dept. of Civil Engineering.
D. N. Contractor, and J. M. Wiggert.
Paper presented at Symposium on Flow--Its Measurement and Control in Science and Industry, May 10-14, 1971, Pittsburgh, Pennsylvania, sponsored by The Instrument Society of America, Pittsburgh. 28 p, 11 fig, 2 tab, 5 ref. OWRR Project A-036-VA (2).

Descriptors: *Floods, *Computer models, *Simulation analysis, *Virginia, Hydrograph analysis, Numerical analysis, Routing, Computer programs, Digital computers, Hydrographs, Flood routing, Streamflow forecasting.
Identifiers: Implicit method, James River (Va).

A computer model was developed for flood flows in the James River in Virginia. If the inflow hydrograph at the head of the river, the hydrographs of the tributaries and the boundary condition at the mouth of the river are specified, the computer program determines the flow parameters at selected stations along the river. Twenty-two stations were chosen along the river (260 miles long) and the cross-sectional shape of the river at these stations was specified. Numerical solutions of the unsteady, open channel flow equations of continuity and momentum were obtained by the implicit method. Storm data of 1967 were used to test the effectiveness of the computer model. Measured and predicted flow parameters were compared at several stations along the river; the model was validated. (See also W71-11317) (Knapp-USGS)
W71-11318

A GENERAL DESCRIPTION OF ISOCHRONE CURVES FOR MOUNTAIN RIVERS OF NORTHEASTERN USSR (Obshchaya kharakteristika krivykh izokhron gornykh rek Severo-Vostoka SSSR),
Gidrometeorologicheskii Institut, Odessa (USSR).
Ye. D. Gopchenko.
Meteorologiya Klimatologiya i Gidrologiya, No 6, p 192-196, 1970. 1 fig, 1 tab, 8 ref.

Descriptors: *Watersheds (Basins), *Runoff, *River systems, Hydrographs, Streamflow, Mathematical studies, Time lag.
Identifiers: *USSR, Mountain rivers, Isochrones, Traveltime.

In formulas of maximum runoff, distribution curves define the effects of the shape of a basin on the arrival of runoff at the outlet. Equidistant curves are drawn for a total of 69 mountain river basins in the northeastern USSR with drainage areas ranging in size from 185 sq km to several thousand sq km. The basins have a variety of shapes, ranging from simple uniform widths to systems with very complex configurations. A table is given, describing the rivers and the geometric shapes of the basins as they apply to concave, convex and rectilinear curves. (Josefson-USGS)
W71-11321

EFFECTS OF VARIABLE INTENSITY OF RAINFALL ON RUNOFF IN THE NORTHERN CAUCASUS (O neravnomernosti khoda livney na Severnom Kavkaze),
Gidrometeorologicheskii Institut, Odessa (USSR).

For primary bibliographic entry see Field 02A.
W71-11322

CHANNEL PROCESSES ON REGULATED NAVIGABLE RIVERS (Ruslovyye protsessy na sudokhodnykh rekakh s zaregulirovannym stokom),
For primary bibliographic entry see Field 08B.
W71-11331

RUNOFF AND WATER BALANCE OF RIVER BASINS OF THE KIRGHIZ SSR (Stok i vodnyy balans rechnykh basseynov Kirgizii),
Sredneazyatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkend (USSR).
A. T. Il'yasov.
Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 43 (58); Leningrad, 1969. 296 p, 61 fig, 59 tab, 119 ref.

Descriptors: *Runoff, *Water balance, *River basins, *Hydrologic data, *Hydrologic cycle, Precipitation (Atomospheric), Rainfall-runoff relationships, Hydrography, Groundwater, Snow, Glaciers, Ice, Hydrographs, Climatic data, Valleys, Mudflows, Seasonal, Water levels, Evaporation, Streamflow.
Identifiers: *USSR, *Kirghiz SSR, Central Asia, Regionalization.

This monograph, consisting of 16 chapters, is devoted to a study of the hydrography, water balance and runoff regime of the Kirghiz SSR. Various phases of the hydrologic cycle are examined, including rainfall, snow, evaporation, groundwater, ice and glaciers, and low streamflow. Special attention is paid to the water balance of mountain basins and of valleys between mountains in the Republic. The concluding section examines the hydrologic regionalization of the area, which is mapped and tabulated according to seasonal distribution of runoff and synchronous fluctuations in annual discharge. (Josefson-USGS)
W71-11333

BUOYANT SLOT JETS INTO STAGNANT OR FLOWING ENVIRONMENTS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
For primary bibliographic entry see Field 05B.
W71-11340

TRANSITING COASTAL RIVER CHANNELS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 08B.
W71-11343

ANALYSIS OF MAJOR RIVER SYSTEMS AND THEIR DELTAS: PROCEDURES AND RATIONALE, WITH TWO EXAMPLES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
J. M. Coleman, and L. D. Wright.
Louisiana State University Coastal Studies Institute Technical Report No 95, April 15, 1971. 125 p, 24 fig, 1 tab, 91 ref, 2 append. ONR Contract No N00014-69-A-0211-0003, Project No NR 388 002.

Descriptors: *River systems, *Deltas, *Geomorphology, Reviews, River basins, Valleys, Alluvium, Streamflow, Runoff, Hydrologic cycle, Flood plains, Environmental effects, Computer programs, Oceanography.

A review of data concerning the great river and delta systems of the world are presented. In the basin, alluvial valley, and delta geomorphic and environmental parameters including the relative areas of various deltaic provinces, distributary patterns, landform types, river mouth and bar types, and deltaic bulge subaerial and subaqueous geometry are determined. Process parameters, including discharge, flood peakedness, sediment load, discharge efficiency, climate, etc., are considered. The oceanographic regimes of the receiving basin are treated in detail. In addition to tides, winds, coastal currents, and continental shelf topography, wave climate and wave power variations along a delta coast are analyzed by a computer program which was developed for that purpose. This program takes into account the effects of wave refraction, shoaling, and frictional attenuation over varying subaqueous topographies. The parameters measured have been arranged in a hierarchical fashion to facilitate input into a retrieval-comparison computer program. (Woodard-USGS)
W71-11344

PROBABILITIES OF OBSERVED DROUGHTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
Jaime Millan, and Vujica Yevjevich.
Colorado State University Hydrology Paper No 50, June 1971. 50 p, 12 fig, 9 tab, 12 ref, 3 append. NSF Grant GK-11564.

Descriptors: *Droughts, *Probability, *Forecasting, Mathematical studies, Stochastic processes, Precipitation (Atmospheric), Runoff, Hydrology, Hydrologic cycle, Model studies, Equations, Analytical techniques.
Identifiers: *Drought probability, *Drought forecasting.

A method is presented for computing the probability or recurrence period of historical droughts by using the longest negative run-length and the largest negative run-sum as basic parameters of samples of a given size, and by using a given probability of the truncation level, a given autocorrelation coefficient, and a given skewness coefficient. The application of this method to selected annual runoff and precipitation series demonstrates its feasibility. The statistical experimental method in generating large numbers of samples is used to compute frequency distributions as the estimates of probability distributions of the longest negative run-length and of the largest negative run-sum in a sample of size N, as descriptors of the largest historical droughts, for normal and nonnormal independent and dependent stationary stochastic processes which follows the first-order linear autoregressive model. Experimentally obtained values are checked with theoretical results for the distribution of the longest negative run-length when the observations are independent. A set of graphs and a set of tables are presented to make the numerical values readily usable. Good approximations for practical computations are demonstrated by fitting lognormal probability distributions to the experimentally obtained frequencies. (Woodard-USGS)
W71-11345

ANALYSIS OF STREAM-TEMPERATURE VARIATIONS IN THE UPPER DELAWARE RIVER BASIN, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02H.
W71-11350

A PROPOSED STREAMFLOW DATA PROGRAM FOR CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07A.
W71-11360

2F. Groundwater

EFFECT OF NON-DARCIAN BEHAVIOR ON THE CHARACTERISTICS OF TRANSIENT FLOW,
Pittsburgh Univ., Pa. Dept. of Civil Engineering; and Wisconsin Univ., Milwaukee. Dept. of Mechanics; and Northwestern Univ., Evanston. Dept. of Civil Engineering.
Hameed Elnaggar, Gabor Karadi, and Raymond J. Krizek.
Journal of Hydrology, Vol 13, No 2, p 127-138, June 1971. 12 p, 6 fig, 13 ref.

Descriptors: *Unsteady flow, *Groundwater movement, *Clays, *Soil water movement, *Darcys law, Seepage, Hydraulic conductivity, Hydraulic gradient, Unsaturated flow, Saturated flow, Numerical analysis, Consolidation.
Identifiers: *Non-Darcian flow.

A modified form of the boundary value problem describing the one-dimensional transient flow in clay soils is formulated to include a non-Darcian flow law with a threshold gradient. The solution is obtained by matrix techniques, and calculated results are compared with results obtained by matrix techniques, and calculated results are compared with results obtained from conventional one-dimensional theory. Both the time rates of settlement and the ultimate settlement are significantly affected. The existence of a threshold gradient causes a substantial decrease in the total ultimate settlement due to consolidation. Based on the excellent agreement between results calculated by the matrix technique for the limiting case of zero threshold gradient and the results obtained directly from classical consolidation theory, the proposed method of solution is judged to be quite accurate. In addition, by use of an averaging procedure for small increments of time, an iterative modification to this method is readily adaptable to the solution of problems involving time-dependent material parameters.
W71-11069

EVALUATION OF MEASUREMENT ERRORS BY REPEATED PUMPING TESTS,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
S. H. Siddiqui and R. R. Parizek.
Journal of Hydrology, Vol 13, No 2, p 182-191, June 1971. 10 p, 5 tab, 7 ref.

Descriptors: *Aquifer characteristics, *Drawdown, *Specific capacity, *Pumping, *Statistical methods, Data processing, Transmissivity, Variability, Water level fluctuations, Discharge (Water), Water yield, Water wells.
Identifiers: *Pumping tests, *Aquifer evaluation.

A pumping test was replicated three separate times on a well near State College, Pennsylvania under controlled conditions to evaluate the magnitude of error and precision that can be achieved in measuring drawdown and specific capacity. Three step-drawdown tests were conducted and eleven different steps were used during each of the three tests. Pumping rates ranged from 60 to 109 gallons per minute. The grand mean and standard deviation of the specific capacity values for the three tests are 11.825 gpm/ft and 0.722. Analysis of variance showed that the variation in specific capacity due to variations in pre-pumping water levels and pumping rates significant.
W71-11073

UNSTEADY FREE SURFACE GROUND WATER SEEPAGE,
Cornell Univ., Ithaca, N.Y. Dept. of Engineering.
Rameshwar D. Verma, and Wilfried Brutsaert.
Journal of the Hydraulics Division, ASCE Proceedings, Vol 97, HY8, Paper 8337, p 1213-1229, August 1971. 17 p, 9 fig, 1 tab, 30 ref, append.

Descriptors: *Groundwater movement, *Unsteady flow, *Seepage, *Aquifers, *Water table, Drawdown, Dupuit-Forchheimer theory, Darcys law, Mathematical models, Hydraulic models, Numerical analysis, Aquifer characteristics.
Identifiers: *Hele-Shaw models.

Seepage in a two-dimensional unconfined aquifer of rectangular cross section is analyzed to allow prediction of the fall of the free surface and the rate of outflow into an adjoining water body which fully penetrates the aquifer. Use is made of saturated

Darcy flow theory with and without the Dupuit assumptions. If the length of the aquifer is larger than four times its depth, the Dupuit assumptions can be applied to predict positions of the water table with adequate precision. Numerical results obtained by the two-dimensional flow model are in agreement with those obtainable experimentally by means of the Hele-Shaw model.
W71-11078

THE NUBIAN ARTESIAN BASIN, ITS REGIONAL HYDROGEOLOGICAL ASPECTS AND PALAEOHYDROGEOLOGICAL RECONSTRUCTION,
Egyptian Desert Inst., Cairo. Water Resources Div.
I. H. Himida.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 89-116, 1970. 28 p, 4 fig, 51 ref.

Descriptors: *Hydrogeology, *Paleohydrology, *Groundwater basins, Aquifers, Sedimentation, Connate water, Saline water intrusion, Artesian wells, Confined water, Water quality, Aquifer characteristics, Geochemistry, Weathering, Leaching.
Identifiers: *Nubian basin (Africa), *Experimental watersheds.

Geological, hydrogeological and hydrogeochemical data are used for interpretation of the regional hydrogeological aspects and evolutionary history of one of the most extensive artesian basins in the world, the Nubian Basin in North-East Africa. The occurrence of thick water-bearing formations containing highly saline water and brines in the northern regions of the Nubian Artesian Basin is explained by the fact that these formations were mainly deposited in marine environments. The occurrence of extensive water-bearing formations containing fresh water in the central and southern regions of the artesian basin is explained by the fact that these areas were mainly developed in continental environments where they have long been subjected to processes of infiltration of fresh meteoric water in the water-bearing formations with displacement of any original saline water. The widespread transgression of the sea from north to south in Middle Cretaceous times covered an extensive area in the central part of the artesian basin that previously developed in continental environments. Accordingly, the pre-existing freshwater horizons in these regions were contaminated by saline sea water. Contamination by saline sea water was most pronounced in the uppermost water-bearing horizons and gradually decreased downwards. In such regions it is normally expected that even after a long period of washing, the groundwater mineralization of the upper horizons should be higher than that in the lower horizons. (Knapp-USGS)
W71-11101

INFLUENCE OF FRACTURED ROCKS ON THE RECESSION CURVE IN LIMITED CATCHMENT AREAS IN HILL COUNTRY: A RESULT OF REGIONAL RESEARCH AND A FIRST EVALUATION OF RUNOFF AT HYDROGEOLOGICAL EXPERIMENTAL BASINS,
Bonn Univ. (West Germany). Institut fuer Geologie; and Geological Survey of North-Rhine-Westfalia (West Germany).
For primary bibliographic entry see Field 02A.
W71-11105

HYDROGEOCHEMICAL BALANCE OF USSR LANDS (O gidrogeokhimicheskom balanse territorii SSSR),
Akademiya Nauk SSSR. Institut Geologii.
V. P. Zverev.
Akademiya Nauk SSR Doklady, Vol 198, No 1, p 161-163, 1971. 3 p, 1 tab, 7 ref.

Descriptors: *Ion transport, *Water chemistry, *Subsurface flow, *Surface runoff, *Salts, Salinity, Gravitational water, Subsurface runoff, Groundwater movement, Precipitation (Atmospheric), Geochemistry, Sulfates, Sodium, Calcium, Bicarbonates.
Identifiers: *USSR, European USSR, Soviet Far East, Chlorine, Hydrogeochemistry, Balance equations, Mineralization.

Subsurface flow of aqueous solutions, moving between areas of groundwater inflow and outflow, is the sum of the ions dissolved from aquifers and those entering groundwater with recharge. The movement of salts in atmospheric precipitation is a major contributor to ionic flow in areas of heavy precipitation near a seacoast. The areas examined are the northwestern part of the European USSR and the Soviet Far East, where precipitation is the primary source of sodium, chlorine and sulfates. Surface runoff plays a predominant role in the total ionic flow of excessively wet regions and areas of perennially frozen rocks. In most cases, surface runoff is the major source of calcium and bicarbonates. Subsurface chemical flow, which is predominant in dry zones, contains large amounts of sodium, chlorine, sulfates, and bicarbonates. Subsurface chemical flow in dry zones is the prime source of accumulation of salts in inland waters and local depressions. (Josefson-USGS)
W71-11116

APPLICABILITY OF MATHEMATICAL MODELS OF GROUNDWATER FLOW SYSTEMS TO HYDROGEOCHEMICAL EXPLORATION,
Idaho Bureau of Mines and Geology, Moscow.
Roy E. Williams.
Idaho Bureau of Mines and Geology Pamphlet 144, May 1970. 13 p, 10 fig, 30 ref.

Descriptors: *Geochemistry, *Groundwater basins, *Groundwater movement, *Mathematical models, Reviews, Surveys, Investigations, Aqueous solutions, Water chemistry, Discharge (Water), Water circulation, Aquifers, Water levels, Exploration.
Identifiers: *Geochemical prospecting.

Mathematical models may be used as a means of analyzing patterns of groundwater flow in geochemical prospecting. The flow systems depicted by these models provide insight into the source areas for geochemical anomalies observed in groundwater. The procedure proposed consists of the identification of geochemically anomalous groundwater discharge zones by a basin-wide sampling program. The recharge areas from which the anomalous groundwater emanates are determined by the construction of mathematical models of the groundwater flow system of the basin in which the discharge area occurs. The criteria on which the mathematical models are based must be determined by hydrogeologic investigation.
W71-11131

COMPARISON OF RESULTS OBTAINED BY DIGITAL COMPUTER AND BY VISCOUS FLOW MODELS FOR FLOW IN TWO-LAYER POROUS MEDIUM,
Institut Za Vodoprivredu Jaroslav Cerni, Belgrade (Yugoslavia).
D. Babac, and B. Matic.
TT 69-51009/2 Translated from Serbo-Croatian. Available from US Dept. of Commerce, Nat. Tech. Inf. Service, Springfield, Va. 22151. Translations, Institute 'Jaroslav Cerni', Vol 15, No 46, p 41-44, 1969. 4 p, 6 fig, 2 ref.

Descriptors: *Surface-groundwater relationships, *Groundwater movement, *Hydraulic models, *Flood plains, *Mathematical models, Simulation analysis, Anisotropy, Dupuit-Forchheimer theory, Infiltration, Reservoir leakage, Percolation, Hydrogeology.
Identifiers: *Hele-Shaw models.

The groundwater regime of two-layer porous media has great practical interest, because most alluvial regions have such aquifer systems. This can be studied by: (a) analytical solution of differential equations; (b) method of water balance; (c) hydrological methods; and (d) model investigations (physical models, electric analog models, viscous flow models), and by combinations of these methods. In the two-layer porous medium considered, the lower layer has the higher hydraulic conductivity. Computer solution of this problem is based on the assumption of limit anisotropy; the flow in the lower layer is considered to be exclusively horizontal to satisfy Dupuit's condition of parallel stream lines, while the flow in the surface layer is exclusively vertical and obeys Darcy's law. By this method the groundwater regime was calculated on a digital computer for a number of profiles of the Danube flood plain near the Djerdap reservoir. The following data were available: (a) piezometric heads; (b) hydraulic conductivity; and (c) geologic and hydrologic data. In order to define more precisely the conditions of flow near the levees and to make some corrections in the computer program if necessary, investigations were also made on a vixcous analog model. (Knapp-USGS)
W71-11139

HYDROLOGY, ACTIVITY, AND HEAT FLOW OF THE STEAMBOAT SPRINGS THERMAL SYSTEM, WASHOE COUNTY, NEVADA,
Geological Survey, Washington, D.C.
Donald E. White.
For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price $1.25 (paper cover). Geological Survey Professional Paper 458-C, 1968. 109 p, 49 fig, 41 tab, 89 ref.

Descriptors: *Nevada, *Hot Springs, *Geysers, *Thermal springs, *Subsurface waters, Mineral water, Thermal water, Heated water, Water vapor, Water chemistry, Confined water, Magmatic water, Percolating water, Groundwater movement, Radioactivity, Chemical analysis, Lava, Steam, Geomorphology, Water pressure, Circulation.
Identifiers: *Steamboat Springs (Nev), *Reno (Nev), *Washoe County (Nev).

Investigations conducted from June 1945 to August 1952 within the Steamboat Springs thermal area, 9 miles southeast of Reno, Nevada, seems to indicate that a large magma body, possibly a batholith, some 20,000 feet below the surface, is the source for the heat in these hot springs. Forming the basement are granitic and metamorphic rocks ranging in age from the Cretaceous to the Miocene which are overlain by Pliocene and Pleistocene sediments of volcanic origin. This study attempted to determine the heat flow and whether surface water from local precipitation was channeled by convection to these thermal springs. Field measurements were obtained from wells drilled in 1920 for resort purposes. The main aquifer is 95 feet below the surface with variations from 40 to 170 feet. Recharge was greater in the vicinity of the springs themselves than in the area of Steamboat Creek. Local snow and rainfall played a large part in these water levels. It is believed that surface water gaining access to the overlying geologic formations migrates down joint and fault systems until it reaches sufficient depth to have its temperature increased to such a point that its vixcosity and density is substantially lowered. In this condition it is forced upward seeking outlets on the surface. Initial heating is believed to occur at 10,000 ft, and upon rising to the 2,000-ft level the water commences to boil due to pressure release. This reduction of pressure occurs at about 2000 ft depending upon the local barometric pressure. Change in air pressure greatly affected the rate of discharge of some of these springs. Barometric response seemed to take place in the upper 350 feet of each subsystem. The total surface discharge of all systems into Steamboat Creek was approximately 600 gpm. (Glasby-USGS)
W71-11141

GROUND-WATER QUALITY AND STRUCTURAL CONTROL IN SOUTHEASTERN VIRGINIA,
Marshall Univ., Huntington, W. Va. Dept. of Geology; and Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
W. S. Rogers, and R. S. Spencer.
Geological Society of America Bulletin, Vol 82, No 8, p 2313-2317, August 1971. 5 p, 3 fig, 14 ref.

Descriptors: *Water chemistry, *Structural geology, *Water quality, *Salinity, *Stratigraphy, Water levels, Virginia, Hydrogeology, Groundwater movement, Faults (Geology), Geologic control, Geochemistry, Groundwater barriers, Chlorides, Coastal plain, Confined water, Aquifers, Aquicludes.

Investigations into the stratigraphy, structure, piezometric surfaces, and groundwater chloride concentrations of the York-James peninsula and adjacent Coastal Plain areas to the south indicate that these geologic factors display a mutual dependence. North-south e-log correlations across the area support existence of the proposed Hampton Roads fault in the vicinity of the James River. Isochlor contour trends subparallel to the James River in the York-James peninsula, and piezometric surfaces show a marked dissimilarity on either side of this river boundary. The high chloride concentrations in this area, plus the disruption of the groundwater system, imply fault control and incursions of saline waters along the Hampton Roads fault zone during times of recurrent movement. A similar situation exists near the confluence of the James River with the Chesapeake Bay, where a disrupted piezometric surface and a high chloride zone are found in conjunction with a proposed north to northwesterly trending fault zone, the Norfolk Hinge. Highest chloride concentrations, greatest disruption of the piezometric surface, and greatest stratigraphic displacement occur near the intersection of these two faults. (Knapp-USGS)
W71-11205

WATER-TABLE EFFECTS ON SEACOASTS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
Richard J. Russell.
Geological Society of America Bulletin, Vol 82, No 8, p 2343-2348, August 1971. 6 p, 2 fig, 14 ref.

Descriptors: *Water level fluctuations, *Water table, *Coasts, *Diagenesis, *Leaching, Sea level, Tides, Groundwater movement, Topography, Beaches, Beach erosion, Carbonate rocks, Water chemistry.
Identifiers: *Beach rock.

Calcareous cementation of unconsolidated sediments and soils within the zone of water-table fluctuation in tropical climates results in the development of widespread layers of water-table rock that extend between beach rock and stream rock outcrops as well as for considerable distances inland. Along cliffy coasts in any climate, the water table separates weathered and leached rock, which is readily erodible, from underlying sections of relatively resistant rock. Along seacoasts, the water-table boundary commonly is expressed by the presence of platforms, shoals, and erosionally flattened bedrock in beaches (pseudo-beach rock). For the reason that coastal retreat lowers water tables, truncated flats commonly develop at successively lower levels, and the resulting topography is subject to misinterpretation, such as the postulation of a very recent, somewhat higher, stand of sea level. (Knapp-USGS)
W71-11209

COMPARISON OF METHODS FOR EVALUATING AQUIFER CHARACTERISTICS,
Hittman Associates, Columbia, Md. Environmental Sciences and Engineering Dept.
Michael A. Nawrocki.
Groundwater, Vol 9, No 4, p 6-11, July-August 1971. 6 p, 6 fig, 2 tab, 13 ref.

Descriws: *Aquifer characteristics, *On-site tests, *Pumping, *Drawdown, *Theis equation, Groundwater movement, Water levels, Water level fluctuations, Missouri, Transmissivity, Permeability, Specific yield, Storage coefficient, Observation wells.
Identifiers: *Aquifer evaluation, Pumping tests.

Nonequilibrium pumping tests were performed at two widely separated sites consisting of one pumped and two observation wells each. The wells at both sites bottomed in the same stratigraphic formation; at one site a confined aquifer was tested, at the other the aquifer was unconfined. Data gathered from the tests were analyzed using the methods developed by Theis, Jacob, Chow, and Hantush. Eight separate determinations of transmissibility, permeability, and specific yield were made at each site. At the unconfined site, all 8 determinations of permeability and transmissibility fell within 90% of the mean of the calculated values. Specific yield predictions showed a wider variation, with individual computations differing by up to 55% from the mean at the confined site. No one method was found to yield consistently higher or lower values for the computed hydrologic characteristics, but the observation well used to make the analysis was found to have a more marked effect on the results obtained. Analysis of the well recovery curves confirmed the existence of local recharge near the test sites, explaining the effect of the use of data from different observation wells on the analysis. (Knapp-USGS)
W71-11215

DRAWDOWN IN A WELL GROUP ALONG A STRAIGHT LINE,
Northwestern Univ., Evanston, Ill. Technological Inst.; Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering; and Wisconsin Univ., Milwaukee. Dept. of Mechanics.
D. Babu Rao, Raymond J. Krizek, and Gabor M. Karadi.
Groundwater, Vol 9, No 4, p 12-18, July-August 1971. 7 p, 6 fig, 1 tab, 2 ref.

Descriptors: *Drawdown, *Computer programs, *Pumping, *Well spacing, Dewatering, Water wells, Equations, Unsteady flow, Aquifer characteristics, Aquifers, Permeability, Transmissivity, Water yield, Groundwater movement.
Identifiers: *Well interference.

Procedures and charts are presented to determine the unsteady drawdown in a group of wells located along a straight line which fully penetrate a homogeneous, isotropic, artesian aquifer. Based on the linearity of the governing field equation, the principle of superposition is used to combine the effects of individual wells, and solutions are obtained by using a digital computer to evaluate an exponential integral. The concepts of equivalent radius, coefficient of interference, and degree of uniformity are introduced, and quantitative graphical relationships are given as functions of the independent variables, which are the number of wells, well spacing, and time. (Knapp-USGS)
W71-11216

HYDROGEOLOGY IN CZECHOSLOVAKIA,
Engineering-Geological and Hydrogeological Survey, Prague (Czechoslovakia). Groundwater Div.
Alexander Zaporozec.
Groundwater, Vol 9, No 4, p 19-24, July-August 1971. 6 p, 3 fig.

Descriptors: *Hydrogeology, *Water resources development, Foreign research, Water wells, Mapping, Research and development, Education, Training, Governments.
Identifiers: *Czechoslovakia.

Groundwater is an important source of water supply in Czechoslovakia, and its use is very carefully planned because the resources are unevenly distributed. The supply is limited because Czechoslovakia is situated on the European water divide between the North, Baltic, and Black Seas, and all waters flow out of the State. The paucity of groundwater resources, requiring assessment and classification of the utilizable groundwater, has led to development of a State groundwater resources zoning plan. Increased demand for groundwater has resulted in extensive and responsible hydrogeological research, contributing to a good knowledge of the groundwater resources. Czechoslovak hydrogeology has been developed to a high level, even though it is a relatively young branch of science, and is in some respects quite advanced, especially in prospecting, development and protection of mineral-water resources, hydrogeological mapping, and groundwater zoning. (Knapp-USGS)
W71-11217

TECHNIQUES FOR QUALITY-OF-WATER INTERPRETATIONS FROM CALIBRATED GEOPHYSICAL LOGS, ATLANTIC COASTAL AREA,
Geological Survey, Norfolk, Va. Water Resources Div.
Donald L. Brown.
Groundwater, Vol 9, No 4, p 25-38, July-August 1971. 14 p, 14 fig, 6 tab, 9 ref.

Descriptors: *Water quality, *Aquifers, *Virginia, *Hydrogeology, *Electrical well logging, Resistivity, Calibrations, Chlorides, Aquifer characteristics, Data collections, Geophysics, Borehole geophysics, Coastal plains, Atlantic coastal plain.
Identifiers: Norfolk (Va).

In the fall and winter of 1967-68, a 2,587-foot test well was drilled at Moore's Bridges Filter Plant, Norfolk, Virginia. The well penetrated rocks of post-Miocene, late and middle Miocene, late Eocene, and younger ages. Empirical water-quality data were used for calculation of groundwater quality from calibrated geophysical logs. Chemical analyses of water samples from seven separate zones at depths between 850 feet to 2,500 feet below sea level indicate that the water type changes from a predominantly sodium bicarbonate water above 1,700 feet to a sodium chloride water in the deeper zones. Using calibrated geophysical logs, an approximation of the dissolved-solids and chloride content may be calculated. In the Tidewater area, if the saturated resistivity (Ro) reading on the electric log is less than 25 ohmmeters the total solids and chloride content of the water are probably in excess of Public Health standards for potable water. An empirical method of calculating the quality of water from electric logs is presented. (Knapp-USGS)
W71-11218

REPLENISHMENT SOURCES OF THE ALLUVIAL AQUIFERS OF THE PERUVIAN COAST,
Tahal Consulting Engineers Ltd., Tel-Aviv (Israel).
Yaakov Gilboa.
Groundwater, Vol 9, No 4, p 39-46, July-August 1971. 8 p, 5 fig, 19 ref.

Descriptors: *Surface-groundwater relationships, *Hydrogeology, *Groundwater recharge, *Aquifers, *Deserts, Return flow, Seepage, Topography, Alluvium, Alluvial channels, Groundwater movement, Coastal plains, Water balance, Rivers.
Identifiers: *Peru, *Alluvial aquifers, Andes.

Groundwater in the arid coastal area of Peru occurs in more than fifty alluvial aquifers. The aquifers are limited to river valleys and to nearby sedimentary plains. The coast is rainless and the river valleys serve as the drainage outlet of the western slopes of the Andes. The coastal alluvial aquifers are located below the lower limit of the active catchment areas, and are not recharged directly by precipitation. The long igneous batholith and the volcanic formations of the Andean Cordillera form an impermeable barrier which prevents the replenishment of the aquifers by underflow from the Andes. The main source of replenishment of the aquifers in the Peruvian

coastal zone is river water. The water infiltrates through the river beds and irrigation canals and migrates laterally within the alluvial deposits. Another important source of recharge is return flow from irrigation. Water also enters the aquifers through boundary faults. (Knapp-USGS)
W71-11219

BIBLIOGRAPHY OF TRITIUM STUDIES RELATED TO HYDROLOGY THROUGH 1966,
Geological Survey, Albany, N.Y.; and Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11254

TRITIATED WATER AS A TRACER IN THE DUMP LEACHING OF COPPER,
Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center., and Institute of Mining and Technology, Socorro, N. Mex. Dept. of Ground-water Hydrology.
For primary bibliographic entry see Field 05B.
W71-11255

GROUNDWATER LEVELS IN NEBRASKA, 1970,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 04B.
W71-11256

AQUIFER-TEST DESIGN, OBSERVATION AND DATA ANALYSIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07A.
W71-11264

ARTIFICIAL RECHARGE OF HYDROLOGICALLY ISOLATED AQUIFERS,
Texas Tech. Univ., Lubbock. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 04B.
W71-11316

GROUNDWATER FLOW OF RIVERS OF THE RUDNYY ALTAY (Podzemnyy stok rek Rudnogo Altaya),
Gidrometeorologicheskii Institut, Odessa (USSR).
V. N. Gontarenko.
Meteorologiya, Klimatologiya i Gidrologiya, No 6, p 205-210, 1970. 2 fig, 1 tab, 7 ref.

Descriptors: *Groundwater, *Base flow, *Rivers, *Watersheds (Basins), *Discharge (Water), Low flow, Slopes, Precipitation (Atmospheric), Karst, Meteorological data, Mapping, Runoff.
Identifiers: *USSR, Altay Territory, Rudnyy Altay, Bukhtarma River, Isolines.

Studies conducted in the Bukhtarma River basin and adjoining small river basins of the Rudnyy Altay were twofold in purpose: (1) to construct a map of the long-term average groundwater flow of basins on a scale of 1:1,000,000 and (2) to calculate the long-term average groundwater flow from the half-sums of low flow discharges for any part of the given region. The basic factors influencing the amount of long-term average groundwater flow, after precipitation, were the mean slope of the basin and the basin forest cover. Groundwater flow for the entire area varied between 2 and 6 liter/sec/sq km. A sharp increase in groundwater flow at the Uryl' River basin (7.6 liter/sec/sq km) and Sarym-Sakty River basin (12.2 liter/sec/sq km) was the result of abundant precipitation, steep mean basin slopes and heavily flooded local karstic rocks. In areas where genetic formulas failed to provide good results, long-term average groundwater flow could be calculated from the relationship of the amount of groundwater flow to the discharges of a river in February and December. Further investigations are required to refine the influence of intrazonal factors on the amount of groundwater flow. (Josefson-USGS)
W71-11320

INFILTRATION AFFECTED BY FLOW OF AIR,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 02G.
W71-11346

A METHOD TO DESCRIBE THE FLOW OF RADIOACTIVE IONS IN GROUND WATER,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07B.
W71-11356

MATHEMATICAL MODEL FOR APPROXIMATING TRANSIENT, THREE-DIMENSIONAL GROUNDWATER SYSTEMS,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Lab; and Montana Univ., Missoula.
A. E. Reisenauer, D. B. Cearlock, and C. A. Bryan.
Available as BNWL SA3539 from Nat. Tech. Inf. Service, Springfield, Va. 22151, $3.00 paper copy, $0.95 microfiche. Paper presented at American Geophysical Union National Fall Meeting December 7-10, 1970, San Francisco, California. 13 p, 6 fig, 1 ref.

Descriptors: *Groundwater movement, *Mathematical models, *Equations, *Dimensional analysis, Computer models, Transmissivity, Analytical techniques, Pumping, Withdrawal, Groundwater recharge, Aquifers, Aquifer characteristics, Flow.
Identifiers: Hydrologic stresses.

A digital computer model was designed to be adaptable through input to most unconfined groundwater aquifer systems and have the capability to describe the transient or steady-state response to a wide variety of hydrologic stresses. The model is referred to as the Variable Thickness Transient (VTT). The design of the model required that it (1) approximate three-dimensional saturated flow, (2) handle complex boundary conditions, (3) describe nonhomogenous porous mediums, and (4) handle vertical recharge or discharge at any or all points in the flow system. An algorithm was developed using the Crank-Nicholson finite difference method and Gauss-Seidel successive relaxation techniques. Since it can be shown theoretically that Crank-Nicholson approximations are numerically stable for any size time increment for linear equations, it was implied that stability might hold for non-linear equations also. Numerical stability was observed for a wide range of time steps for the test problem and also actual field problems. (Woodard-USGS)
W71-11359

UNSTEADY FLOW TOWARD PARTIALLY PENETRATING ARTESIAN WELLS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 04B.
W71-11403

PROCEEDINGS OF GROUNDWATER SYMPOSIUM, AUGUST 28-29, 1969.
New South Wales Univ., Kensington (Australia). Water Research Lab.

Water Research Laboratory Report No 113, April, 1970.

Descriptors: *Groundwater, *Groundwater recharge, *Water reuse, *Systems analysis, Analog models, Conjunctive use, Aquifers.
Identifiers: *Non-Darcy flow.

Partial contents: Groundwater in Unconsolidated Sediments - Recent Developments in New South Wales, by W. H. Williamson. Non-Darcy Flow in the Vicinity of Wells, by C. R. Dudgeon and C. N. Au Yeung. One-Dimensional Groundwater Recharge, by K. K. Watson. Artificial Groundwater Recharge - Operational Features in the Burdekin Delta and Investigation Programme in the Bundaberg Area, by H. V. Macdonald. Wastewater Reclamation Using Groundwater Recharge - A Review, by B. W. Gould. Groundwater Analogues, by J. D. Lawson and A. K. Turner. Hydrogeologic Electric Analogue Models Constructed by the South Australia Mines Department, by D. McPharlin. Digital Models in Regional Groundwater Studies, by D. H. Pilgrim. System Modelling for Conjunctive Use of a Groundwater Aquifer and a Surface Reservoir, by D. T. Howell and P. R. Johnston. Nuclear Techniques in Groundwater Hydrology, by G. E. Calf, and others. (WES)
W71-11419

2G. Water in Soils

A PERTURBATION ANALYSIS OF TWO-PHASE INFILTRATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
Alain Noblanc, and Hubert J. Morel-Seytoux.
Colorado State University, Dept. of Civil Engineering Research Report, December 1970. 28 p, 10 fig, 3 ref, append. OWRR Project B-033-COLO (5).

Descriptors: *Infiltration, *Mathematical models, Equations, Unsaturated flow, Percolation, Drainage, Numerical analysis, Seepage, Soil water movement, Darcys law.
Identifiers: Infiltration prediction.

An analytical treatment is given for a unidimensional flow of two immiscible fluids, water and air, into a homogeneous porous medium. From the principle of continuity and Darcy's law a second order partial differential equation is derived, in terms of water saturation, time, and depth into the medium. In this differential equation the effect of capillarity is represented by a perturbation term. Even though the equation is solved approximately, the effect of capillarity is not completely neglected in the determination of the saturation profile. The knowledge of an approximate saturation profile leads to the determination of the rate of water infiltration by a combination of Darcy's law and the principle of continuity in an integrated form. Infiltration rate curves are obtained for a number of situations involving difference boundary and initial conditions. (Knapp-USGS)
W71-11064

INFILTRATION PREDICTIONS BY A MOVING STRAINED COORDINATES METHOD,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. J. Morel-Seytoux, and A. Noblanc.
Colorado State University, Dept. of Civil Engineering Research Report, December 1970. 26 p, 2 fig, 8 ref, append.

Descriptors: *Infiltration, *Mathematical models, Equations, Unsaturated flow, Percolation, Drainage, Numerical analysis, Seepage, Soil water movement, Darcys law.
Identifiers: Infiltration prediction.

A method is presented for calculating infiltration by a perturbation scheme that does not contain capillary terms. In the first order equation providing the starting point in the solution, not all the capillary terms are neglected but only the less significant one. As a result, it is not necessary to develop several equations to be solved successively but only one. The method, valid for any time, is an adaptation of the concepts that led to the development of the extremely useful so-called 'boundary layer theory'. It makes use of a mathematical method known as the method of strained coordinates and a modified version of it could be termed the method of moving strained coordinates. The solution exhibits the characteristics of experiment of infiltration or of gravity drainage. The approach takes into account the resistance to air flow through the medium and the compressibility of air. Numerical procedures are employed only for integration and differentiation, and are neither more involved nor more extensive than Philip's method, yet they use natural hydrologic boundary conditions rather than assumed moisture boundary conditions and are valid for soils or finite extent

bounded by an impervious lower boundary. (Knapp-USGS)
W71-11065

LATERAL FLOW UNDER CYLINDER INFILTROMETERS: A GRAPHICAL CORRECTION PROCEDURE,
Rodney C. Hills.
Journal of Hydrology, Vol 13, No 2, p 153-162, June 1971. 10 p.

Descriptors: *Infiltrometers, *Soil water movement, *Infiltration, Model studies, Hydraulic models, Calibrations, Seepage, Wetting, Unsaturated flow, Saturated flow.
Identifiers: Infiltration capacity.

Experiments using a half cylinder in a glass fronted box filled with homogeneously mixed materials show that, over a wide range of infiltration capacities, the wetted shape remains fairly constant in form. From the wetted shapes a set of correction factors is computed allowing correction to be made for lateral flow from a 10 cm diameter cylinder infiltrometer.
W71-11071

THE INFLUENCE OF LAND MANAGEMENT AND SOIL CHARACTERISTICS ON INFILTRATION AND THE OCCURRENCE OF OVERLAND FLOW,
Bristol Univ. (England).
For primary bibliographic entry see Field 02A.
W71-11072

ORIGIN OF SODIUM-SULFATE SALINIZATION IN THE CASPIAN REGION AS A RESULT OF THE METAMORPHISM OF SEA SALTS (O proiskhozhdenii sul'fatno-natriyevogo zasoleniya v Prikaspii vsledstviye metamorfizatsii soley morskogo genezisa),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
For primary bibliographic entry see Field 02K.
W71-11120

ZONAL ASPECTS OF THE WATER PERMEABILITY OF SOILS IN THE EUROPEAN USSR (Vodopronitsayemost' pochv Yevropeyskoy chasti SSSR v zonal'nom aspekte),
Leningrad State Univ. (USSR).
G. V. Nazarov.
Akademiya Nauk SSSR Doklady, Vol 192, No 6, p 1360-1362, 1970. 3 p, 3 fig, 1 tab, 11 ref.

Descriptors: *Permeability, *Soil types, *Chernozems, *Land use, Chestnut soils, Soil structure, Podzols, Forest soils, Humus, Humic acids, Arable land, Surface runoff.
Identifiers: *USSR, Water regime, Solonetzes, Forest belts, Virgin land, Steppe soils, Zonality, Perennial grasses, Idle land.

Like all other water-physical properties of soil, water permeability obeys the law of zonality but may vary significantly within a zone as the result of agricultural activity. Typical Chernozems followed by Ordinary and Leached Chernozems possess the highest water permeability among the soils of the steppe zone. The water permeability of the various soil groups examined decreases to the north and south of the Typical Chernozem zone. Soils under grain crops have a higher water permeability than those under idle land, perennial grasses and virgin land. The influence of agricultural soil use on water permeability is most evident in Chernozem soils. (Josefson-USGS)
W71-11121

SEASONAL DYNAMICS OF THE COMPOSITION OF LYSIMETRIC AND BROOK WATERS IN PODZOLIC SOILS OF CONIFEROUS FORESTS (Sezonnaya dinamika sostava lizimetricheskikh i ruch'yevykh vod v podzolistykh pochvakh pod khvoynymi lesami),
Leningrad State Univ. (USSR). Chair of Biogeography; and Leningrad State Univ. (USSR). Dept. of Geography.
N. S. Sotnikova.
Pochvovedeniye, No 10, p 31-43, October 1970. 13 p, 1 fig, 4 tab, 9 ref.

Descriptors: *Lysimeters, *Soil chemical properties, *Water chemistry, *Soil profiles, *Water analysis, Chemical analysis, Podzols, Nutrients, Seasonal, Clays, Soil water, Groundwater, Carbonates, Iron, Aluminum, Nitrogen, Phosphorus, Sampling, Potassium, Precipitation (Atmospheric).
Identifiers: *USSR, Leningrad Oblast, Lysimetric water, Brook water, Soil solutions, Silicon.

The results of studies on a Sod Podzolic clay soil and a sandy illuvial-ferruginous-humic Podzol in the Leningrad Oblast are examined. The content of elements in lysimetric waters and their migration were found to depend upon their importance as a plant nutrient and on the presence of their available forms in the soil and soil solutions. Nitrogen, phosphorus and potassium migrate only slightly in the soil profile. Calcium, magnesium, sulfur, silicon, iron and aluminum migrate more extensively, although the migration of silicon, iron and aluminum is severely impaired in Sod-Podzolic soil by the seasonal rise of groundwater containing carbonates. Maximum seasonal variations in lysimetric waters were observed in the upper horizons of the two soils studied; the variations are attributable to the seasonal supply and decomposition of litter, precipitation intensity and the effect of soil water from the lower horizons. The fact that silicon is retained in the podzolic horizons of the soils considered attests to its residual and absolute accumulation. The retention of iron and aluminum in the B horizon of the clay soil and the removal of silicon from it result from the reaction of the medium, which depends upon the carbonate content of the parent material. (Josefson-USGS)
W71-11123

DISTRIBUTION OF SODIUM CARBONATE SALINIZATION IN THE GROUNDWATER AND SOILS OF THE LOWER DON FLOODPLAIN AND DELTA (Rasprostraneniye sodovogo zasoleniya v gruntovykh vodakh i pochvakh poymy i del'ty nizhnego techeniya r. Don),
R. N. Smirnov.
Pochvovedeniye, No 10, p 100-104, October 1970. 5 p, 2 fig, 9 ref.

Descriptors: *Salinity, *Salts, *Carbonates, *Bicarbonates, *Water chemistry, Land reclamation, Sodium, Sodium sulfate, Sodium chloride, Alkalinity, Loess, Flood plains, Deltas, Groundwater.
Identifiers: *USSR, *Salinization, *Mineralization, Rostov Oblast, Don River, Sodium carbonate, Sodium bicarbonate, Outliers, Solonetzes.

Sodium carbonate salinization has been found in the soils and groundwater of the Don floodplain and delta. A correlation has been established between the distribution of sodium carbonate salinization and the loesslike deposits. A sodium bicarbonate type of groundwater salinization prevails in the eastern part of the floodplain on the terrace outliers and in the small insular delta. The extensive development of a sodium bicarbonate type of groundwater salinization is associated with a mineralization ranging from 0.4 to 1.7 g/liter. The persistent sodium bicarbonate salinization of the groundwater in the region of the terrace outliers and their bases is related to presence of sources of sodium carbonate-sulfate and sulfate-sodium carbonate salinization in the soils. Sodium carbonate salinization is quite pronounced in the terrace outliers, less so at their bases. A substantial amount of normal carbonates (up to 3 meq of CO_3) is accumulated in the profiles of crustal and surface Solonetzes. A special study of the sources and causes of accumulation and migration of sodium carbonate solutions is essential in planning extensive reclamation of the floodplain lands. (Josefson-USGS)
W71-11124

RADIATION MEASUREMENT OF SOIL DENSITY AND MOISTURE CONTENT IN AGROPHYSICAL STUDIES (O radiometrii plotnosti i vlazhnosti pochv v agrofizicheskikh issledovaniyakh),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
V. A. Rozhkov.
Pochvovedeniye, No 10, p 75-82, October 1970. 8 p, 4 fig, 5 tab, 6 ref.

Descriptors: *Radiation, *Instrumentation, *Soil density probes, *Nuclear moisture meters, Moisture meters, Nuclear meters, Soil moisture meters, Soil density, Soil moisture, Moisture content, On-site investigations, Bulk density, Water storage, Correlation analysis, Gravimetric analysis, Podzols, Land use, Wettability.
Identifiers: *USSR, *Radiometry, Sod-Podzolic soils, Regression equations, Correlation coefficients, Chronoisopleths.

Conventional methods for determining the moisture content and bulk density of soils have not kept pace with the sophisticated procedures and increased volume of data used in soil investigations. Hence, it has become necessary to test promising radiometric methods to evaluate their suitability for agrophysical observations at stations and on field trips. The PGM-1 surface gamma density meter and the all-purpose NVU-1 neutron moisture meter were tested in 1969 on variously podzolized and gleyed Sod-Podzolic soils, including eroded soils, in different land uses (forest, idle land and plowed land). The instruments tested increase measurement efficiency 2-8 fold and are quite suitable for agrophysical investigations. The data obtained by these instruments correlate well with the results obtained by conventional methods. (Josefson-USGS)
W71-11125

PERCHED WATER IN SOILS OF THE FOOTHILLS OF THE KRASNODAR KRAY (Verkhodka v pochvakh predgoriy Krasnodarskogo kraya),
V. I. Uvarov.
Pochvovedeniye, No 9, p 118-124, September 1970. 7 p, 1 fig, 1 tab, 18 ref.

Descriptors: *Perched water, *Water table, *Soil physical properties, *Soil chemical properties, *Forest soils, Flow, Precipitation (Atmospheric), Soil profiles, Bulk density, Porosity, Soil structure, Land reclamation, Humus, Seasonal, Seepage, Observation wells.
Identifiers: *USSR, Krasnodar Kray, Water erosion, Moisture capacity.

Perched water is observed in Light-Gray, Gray and Dark-Gray Forest soils of the foothills of the Krasnodar Kray 6-7 months of the year, permanently in winter and spring and periodically in summer after heavy and persistent rains. The lower boundary of this water coincides with that of the podzolized horizon and its upper boundary fluctuates depending on the amount of precipitation and may reach and flood the lower part of the humus horizon. The water flows mainly through the podzolized horizon, saturating the plow layer, damaging crops and promoting erosion, both at the surface and in the soil and removing water-soluble nutrients and organomineral colloids. Recommendations are made for controlling the harmful effects of perched water by lowering the perched water table and by intensifying lateral flow. (Josefson-USGS)
W71-11126

WATER-PHYSICAL CONSTANTS OF A LEACHED CHERNOZEM OF THE ALTAY KRAY (Vodno-fizicheskiye konstanty vyshchelochennogo chernozema Altayskogo kraya),
G. V. Zhuravleva.
Pochvovedeniye, No 3, p 149-155, March 1970. 7 p, 5 tab, 20 ref.

Descriptors: *Moisture availability, *Moisture content, *Soil moisture, *Soil water, *Wilting point, Hygroscopic water, Gravitational water, Absorption, Capillary action, Capillary conductivity, Chernozems, Particle size, Plant growth.
Identifiers: *USSR, Altay Kray, Ob' River, Pot experiments, Moisture capacity, Hygroscopicity, Depth of wetting.

Miniature pot experiments were conducted with a Leached Chernozem medium loam from the forest-steppe of the Ob' region of the Altay Kray to find the ratio of permanent wilting moisture (WM) to maximum hygroscopicity (MH), the minimum moisture capacity (MMC) and interrupted capillary moisture (ICM). The WM/MH ratio was found to be 1.17 in the 0- to 50-cm layer of the soil and 1.03 in the 50- to 150-cm layer. The amount of water unavailable to plants was 94.7 mm in the upper 1 m of the soil and 133.4 mm in the 1.5 m layer. The ICM was 18.7% of the weight of absolutely dry soil in the 0- to 30-cm layer, 14.8% in the 30- to 60-cm layer, and 10% in the 60- to 100-cm layer. Soil moisture was readily available to plants when the amount of available water in the 0- to 50-cm and 50- to 100-cm layers of soil was more than 48 mm and 30 mm, respectively. No difference was found in the MMC values 5, 10 and 13 days after water absorption ceased. A permanent minimum moisture capacity in the soil was established 5 days after cessation of absorption. Deep loosening of the soil in the fall may increase the depth of wetting to minimum moisture capacity and promote the accumulation of available water during the fall-winter-spring period. (Josefson-USGS)
W71-11127

CONDITIONAL STABILITY CONSTANTS OF A NORTH CAROLINA SOIL FULVIC ACID WITH Co (2..) AND Fe (3..),
Geological Survey, Denver, Colo.
R. L. Malcolm, E. A. Jenne, and P. W. McKinley.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 479-483, June 1970. 5 p, 4 ref.

Descriptors: *Chelation, *Soil water, *Fulvic acids, *Cobalt, *Iron, Chemical reactions, Organic acids, Organic compounds, Water chemistry.
Identifiers: Metal organic complexes.

Fulvic acid-cobalt conditional stability constants are 2.7, 4.0 and 6.6 at pH 3.0, 4.5 and 6.0, respectively. Conditional constants for fulvic acid-Fe complexes are 4.5, 5.4 and 5.6 at pH 3.0, 4.5 and 6.0, respectively. These values were obtained using the resin-exchange method of Schubert (1948) which involves radio-tracer techniques. The conditional stability constants are believed to be more indicative of fulvic acid-ionic relationships in natural soil and water environments than the thermodynamic constants. The thermodynamic stability constants for the complexes studied can be calculated by correcting the conditional constants for competitive complex formation with the Cl ligand, hydrolysis of ionic species, protonation of the organic ligand, and activity coefficients of the reacting species. (See also W71-11226) (Knapp-USGS)
W71-11246

WATER COMPOSITION CONTROLS BY CLAY MINERALS,
Washington State Water Research Center, Pullman.
J. A. Kittrick.
Available from the National Technical Information Service as PB-202 224, $3.00 in paper copy, $0.95 in microfiche. Completion Report, July 1971. 6 p, 1 fig. OWRR Project A-042-WASH (2).

Descriptors: Clays, *Clay minerals, Soil types, Soils, Hydrogen ion concentration.
Identifiers: *Vermiculite, Chlorite, *Mineral stability.

The composition limits imposed upon waters by clay minerals can be determined from the thermodynamic stability of the clay minerals. One of the major clays minerals in soils and sediments is vermiculite and during 1970 efforts were concentrated on completing stability determinations upon this mineral. In solution pH is the range of 4 to 4.5, samples of a phlogopite-derived vermiculite became supersaturated with respect to kaolinite, montmorillonite, and amorphous silica. The aluminum-hydroxide potential supported in high-silica solutions by this vermiculite approached that of gibbsite. These results indicate that this vermiculite is unstable at acid pH, where this vermiculite and most others are formed in nature. Conditions of maximum stability of vermiculite were determined to be alkaline pH and high Mg and silica activities. Experiments close to conclusion indicate that a phlogopite-derived vermiculite and biotite-derived vermiculite are both unstable under these conditions also. These experiments indicate that vermiculite is a fast-forming intermediate that is unlikely to control the activities of its constituent ions in natural waters.
W71-11300

THERMODYNAMICS OF WATER IN SOILS (Termodinamika vody v nekotorykh pochvakh),
Moscow State Univ. (USSR). Dept. of Soil Physics and Reclamation.
V. G. Vityazev.
Vestnik Moskovskogo Universiteta; Seriya 6, Biologiya, Pochvovedeniye, No 2, p 116-118, March-April 1971. 2 fig, 4 ref.

Descriptors: *Thermodynamics, *Soil physics, *Soil moisture, Soil physical properties, Soil water, Free energy, Energy budget, Chernozems, Podzols, Particle size.
Identifiers: *USSR, Moscow Oblast, Kamennaya Steppe.

The energy potential of force fields in soil may be determined by the magnitude of the free energy of water. The character of the relationship between the energy state of water and the moisture content of soil was examined for genetic horizons of a Sod-Severely Podzolic soil of the Moscow Oblast and of an Ordinary Chernozem of the Kamennaya Steppe. The psychrometric method proposed by I. I. Sudnitsyn and V. D. Skalaban (1968) was used to obtain typical soil moisture curves within a wide range of pF measurements. Inflections caused by the influence of the composition and properties of the solid state of the soil were defined by the typical curves of some of the soil horizons examined. (Josefson-USGS)
W71-11324

INFLUENCE OF MICRORELIEF AND RAVINES ON THE SOIL MOISTURE OF SLOPES (Vliyaniye mikrorel'yefa i ovragov na izmeneniye vlazhnosti pochvy sklonov),
Gidrometeorologicheskii Institut, Odessa (USSR).
A. V. Shvebs.
Meteorologiya Klimatologiya i Gidrologiya, No 6, p 130-135, 1970. 2 fig, 10 ref.

Descriptors: *Soil moisture, *Soil water, *Topography, *Slopes, *Ravines, Chernozems, Erosion, Groundwater, Soil properties, Seasonal.
Identifiers: *USSR, Moldavia, Microrelief.

Microrelief and ravines may disrupt the distribution patterns of soil moisture reserves on slopes. Studies conducted in Moldavia in 1957 illustrate the effect of microrelief on the water regime of a moderately loamy Southern Chernozem. The influence of microrelief is clearly seen in the 20-60-cm soil layer where the differences in moisture content during a dry period are 2.5%. In the lower soil horizon (60-100 cm) the slope distribution of moisture is more even, with the maximum difference being 1%. Ravines adversely affect the physical properties of soils on ravine sections of a slope and lead to lower groundwater levels and to soil dessication. The moisture content of soil on a slope terminating in a ravine decreases generally in proportion to its proximity to the erosion. The immediate effect of ravines on the moisture content of the upper horizons of a soil on slopes near ravines is negligible and extends only 5-10 m along the ravine. (Josefson-USGS)
W71-11325

EFFECT OF IRRIGATION WITH EFFLUENTS FROM THE VOLGA CHEMICAL COMBINE ON THE AGROMELIORATIVE CHARACTERISTICS OF LIGHT CHESTNUT CLAY LOAM SOILS (Vliyaniye orosheniya stochnymi vodami Volzhskogo khimkombinata na agromelioirativnyye pokazateli tyazhelosuglinistykh svetlo-kashtanoyykh pochy),
For primary bibliographic entry see Field 05C.
W71-11327

EXPERIMENTAL STUDY OF THE DYNAMICS OF THE CAPILLARY RISE OF WATER IN THE SOIL (Eksperimental'noye izucheniye dinamiki kapillyarnogo pod'yema vlagi v pochve),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
V. V. Rybina.
Pochvovedeniye, No 6, p 48-54, June 1970. 3 fig, 8 ref.

Descriptors: *Soil physics, *Capillary action, *Capillary water, *Soil water, Soil physical properties, Soil water movement, Quartz, Sands, Wettability, Films, Surface tension.
Identifiers: *USSR, Capillary rise.

The use of motion-picture films to study the rise of water in glass capillaries and quartz sand was examined in conjunction with an analysis of pertinent data on soil found in the literature. It was established that the water in capillaries rises in two stages due to the difference in the nature of the forces and conditions affecting this process. The parabolic relationship of the height of the rise of water in soil with time reflects the resultant movement of the water in capillaries of different size and quality. The capillary rise of water in soil is a statistical process of a jumplike nature, which is determined by the different wettability of the various areas of the pore walls. (Josefson-USGS)
W71-11328

INVESTIGATION OF WATER CONDUCTIVITY IN UNSATURATED ARTIFICIAL SOIL SYSTEMS (Issledovaniye vlagoprovodnosti nenasyshchennykh model'nykh pochvennykh sistem),
Akademiya Nauk SSSR, Moscow. Institut Fizicheskoie Khimii; and Politekhnicheskii Institut, Leningrad (USSR).
N. V. Churayev, and M. M. Gorokhov.
Pochvovedeniye, No 6, p 54-60, June 1970. 3 fig, 25 ref.

Descriptors: *Capillary conductivity, *Flow, *Soil physics, Darcys law, Capillary action, Capillary water, Porous media, Porosity, Flow rates, Moisture content, Plasticity, Saturation, Rheology, Non-Newtonian flow, Surface tension, Viscosity, Equations, Sands, Quartz.
Identifiers: *USSR, Film water, Pore water, Pressure gradient, Flow velocities, Colmatage.

Extensive experimental data are available which attest to marked deviations from Darcy's law during flow of water in fine sand porous media. Deviations were found when the degree of saturation of the pore volume of quartz sand was reduced to 0.19. This effect is associated with the viscoplastic properties of film water separating the capillary wedges. At low saturation of soil systems the water conductivity must be a function of not only the moisture content but of the pressure gradient as well. (Josefson-USGS)
W71-11329

ANOMALIES IN WATER FILTRATION THROUGH PEAT SOILS (O kharaktere anomaly pri fil'tratsii vody v torfyanykh pochv-gruntakh),
N. I. Il'in.
Pochvovedeniye, No 7, p 116-122, July 1970. 3 fig, 4 tab, 18 ref.

Descriptors: *Filtration, *Peat, *Soil physics, *Flow, Soil physical properties, Groundwater movement, Permeability, Flow rates, Porosity, Discharge (Water), Drainage, Tracers, Observation wells.
Identifiers: *USSR, Filtration rates, Anomalous filtration, Upland peat, Lowland peat.

Anomalous filtration in soils is analyzed on the basis of experiments with upland peat of the 'Galitskiy Mokh' deposit where anomalous filtration was clearly expressed. Layers with anomalous filtration are defined as those where the ratio of the filtration rate to water flow velocity does not correspond to the porosity of the given layer. Water migrates in Peat soils in two ways: along pores (filtration) and along a system of large passages (flow). The filtration rate in peat beds is low and obeys a linear law. Deviations from linearity may be expected only when the existing flow regime is disturbed. About 50% of the total amount of groundwater in upland peat moves by flow. The presence of flow is evidenced by an effective porosity higher than the computed porosity, by log-normal spatial distribution of permeability, anomalous direction of groundwater movement, and movement of a radioactive tracer through an observation hole. (Josefson-USGS)
W71-11330

INFILTRATION AFFECTED BY FLOW OF AIR,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
David B. McWhorter.
Colorado State University Hydrology Paper No 49, May 1971. 43 p, 29 fig, 21 tab, 36 ref, 6 append.
NSF Grant G-2698.

Descriptors: *Soil water movement, *Infiltration, *Porous media, *Groundwater movement, Air-earth interfaces, Model studies, Mathematical studies, Theoretical analysis, Equations, Hydrologic cycle, Capillary fringe, Air-water interfaces, Boundaries (Surface), Air circulation, Compressible flow, Immiscibility.
Identifiers: *Immiscible fluids, Air flow.

The phenomenon of one-dimensional flow of two immiscible fluids in porous media is studied both theoretically and experimentally with particular emphasis on the infiltration problem. Both a theoretical and experimental analysis of infiltration, subject to a 'rainfall' boundary condition are presented. The effect of counter-flowing air is included. The factors affecting the time at which ponding occurs are discussed. It is shown that the capillary pressure at the surface of the porous medium approaches the value at which ponding occurs almost asymptotically in time when the infiltration rate is near the unsaturated hydraulic conductivity. The surface value of capillary pressure (or saturation) at which ponding occurs is not the value predicted from a one-phase flow analysis. Experiments on infiltration into bounded columns show that the rate of infiltration is significantly impeded by the compression of air in the closed column. The physics of this process is analyzed and discussed. (Woodard-USGS)
W71-11346

MODELS FOR SUBSURFACE DRAINAGE,
Colorado State Univ., Fort Collins, Dept. of Agricultural Engineering; and Agricultural Research Service, Fort Collins, Colo.
W. E. Hedstrom, A. T. Corey, and H. R. Duke.
Colorado State University Hydrology Paper 48, April 1971. 56 p, 43 fig, 23 tab, 66 ref, 7 append.

Descriptors: *Subsurface drainage, *Model studies, *Soil properties, *Soil water movement, Water table, Mathematical models, Equations, Porous media, Hydrology, Hydrologic cycle, Vegetation, Capillary fringe.
Identifiers: *Relief drains, Transient flow.

The effects of the drainable water above the water table on drainage behavior were analyzed to determine their magnitude and the extent to which they are influenced by soil parameters. These effects were shown to be (1) an increase of the vertical dimensions of the flow region and (2) a reduction in the outflow as predicted by assuming no drainable water above the water table. The Brooks-Corey scaling theory was first shown experimentally to be valid for two-dimensional transient-flow drainage and was then applied in an analysis of the problem. This analysis, using the Brooks-Corey scaled variables, demonstrated that the pore-size distribution index, which is related to the range of the pore sizes of the soil, was of primary importance. Drainage tests of two soils having different pore-size distribution indices were conducted. A numerical solution was developed and applied to the problem by simulating drainage from soil of other pore-size distribution indices. Results from the experiments and the numerical solution showed that drainage was affected by pore-size distribution as measured by the index. (Woodard-USGS)
W71-11347

MATHEMATICAL SIMULATION OF INFILTRATING WATERSHEDS,
Colorado State Univ., Fort Collins.
Roger E. Smith, and David A. Woolhiser.
Colorado State University Hydrology Paper No 47, January 1971. 44 p, 46 fig, 2 tab, 59 ref, append.

Descriptors: *Soil water movement, *Overland flow, *Infiltration, *Porous media, Model studies, Mathematical models, Equations, Watersheds (Basins), Earth-water interfaces, Unsaturated flow, Surface runoff, Unsteady flow.
Identifiers: Kinematic wave, Finite-difference methods.

The partial differential equation for vertical, one-phase, unsaturated flow of water in soils is used as a mathematical model governing infiltration. A nonlinear Crank-Nicolson implicit finite-difference scheme is used to obtain solutions to this equation for realistic initial and upper boundary conditions. The kinematic wave approximation to the equations of unsteady overland flow on cascaded planes is used for the mathematical model of surface runoff. The difference equations of infiltration and overland flow are combined into a model for a simple watershed, employing computational logic so that boundary conditions match at the soil surface. The mathematical model is tested by comparison with data from a laboratory soil flume and with data from a small experimental watershed. (Woodard-USGS)
W71-11348

SYSTEMATIC TREATMENT OF THE PROBLEM OF INFILTRATION,
Colorado State Univ., Fort Collins. Environmental Resources Center.
H. J. Morel-Seytoux.
Available from the National Technical Information Service as PB-202 208, $3.00 in paper copy, $0.95 in microfiche. Completion Report Series, No. 23, Environmental Resources Center, Colorado State University, Ft. Collins, June 30, 1971, 22 p, 10 fig, 14 ref. OWRR Project B-033-COLO (9).

Descriptors: *Infiltration, *Soils, *Flow, *Air circulation, Air entainment, Numerical analysis.
Identifiers: *Two-phase flow, Air compressibility, Air counterflow.

The effects of air movement and air compressibility on infiltration in soil columns are important. For soils underlain by a relatively impervious layer or by a shallow water table, errors on the order of 30 percent can result. Approximate solutions to the two-phase formulation of the problem of infiltration (i.e. accounting for both water and air movement) give more accurate predictions than exact solution to the unsaturated flow formulation (i.e., accounting only for water movement). The two-phase theory has the significant advantage of accounting for observed experimental results which cannot be modeled by the one-phase flow theory. The approximate solutions are not only more accurate, but also more economical. The costs of computer runs for prediction of infiltration rates by the analytic approximate method were on the order of one-tenth of the costs involved in the numerical finite-difference solution of the two-phase flow equations.
W71-11406

GAS CHROMATOGRAPHY: TECHNIQUES AND USES IN SOIL, PLANT, AND WATER ANALYSIS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 02K.
W71-11410

WATER IN THE UNSATURATED ZONE; PROCEEDINGS OF THE WAGENINGEN SYMPOSIUM.
International Association of Scientific Hydrology, Gentbrugge (Belgium).

IASH Publication numbers 82 and 83, 1969. 2 vols.

Descriptors: *Groundwater, *Base flow, *Capillary action, *Soil moisture, *Soil physical properties, Soil water movement.

This symposium, held in connection with the International Hydrological Decade (1965-1975), contains 106 papers. Chapter contents: Determination of Soil Moisture. Determination of Soil Moisture Potential. Determination of Capillary Conductivity and Diffusivity. Relation Between Soil Characteristics and Soil Properties. Infiltration and Redistribution of Soil Moisture Following Precipitation and Its Influence on Groundwater Flow. The Mathematics of Unsaturated Flow. Energy Relations in Water Transport and Supply of Water by Capillary Rise. Evaporation from Bare Soils and Accumulation of Salts. Extraction of Soil Moisture by Plants. Influence of Temperature on the Transport of Water. Rate of Recharge of Groundwater and Its Influence on Groundwater Flow. Effect of the Capillary Fringe on Groundwater Flow. Storage Capacity. (WES)
W71-11418

DISTRIBUTION OF HYDROCARBON-OXIDIZING MICROORGANISMS IN SOILS OF THE MAIN OIL DEPOSITS IN UZBEKISTAN,
Akademiya Nauk Uzbekskoi SSR, Tashkent. Microbiology Branch.
For primary bibliographic entry see Field 05B.
W71-11560

2H. Lakes

THE EFFECTS OF AGE AND WATER FLUCTUATIONS ON THE LIMNOLOGICAL FACTORS OF IMPOUNDED WATERS,
Mississippi State Univ., State College. Water Resources Research Inst.
D. H. Arner, W. J. Lorio, B. M. Teels, and E. D. Norwood, Jr.
Available from the National Technical Information Service as PB-202 160, $3.00 in paper copy, $0.95 in microfiche. Completion Report, Mississippi Water Resources Research Institute, State College, June, 1971. 49 p, 9 fig, 27 tab, 12 ref, append. OWRR Project A-047-MISS (1).

Descriptors: Limnology, *Reservoirs, Fish management, *Drawdown, *Water level fluctuations, Fluctuation, Impoundments, Impounded waters, *Lakes, Water pollution effects, Mississippi, *Benthos, *Plankton, *Fish populations.

Identifiers: Bluff Lake (Miss), Oktibbeha County Lake (Miss), Tendipes, Pentoneura, Chaoborus.

Two lakes having similar soil types were studied to determine the effects of age and water fluctuations on plankton, benthos and fish populations. Bluff Lake is an older man-made lake which is drawn from in the mid-summer in order to encourage food plants for waterfowl. Oktibbeha County Lake is a young lake and the water levels are maintained. Chemistry data from the two lakes indicate that their chemical properties are very similar. Neither lake would be considered very fertile. Net plankton populations in Bluff Lake and Oktibbeha County Lake were comparable when analyzed on a number of organisms per liter basis. Peak populations occurred in both lakes in the fall. There was a spring peak in Bluff Lake but none occurred in Oktibbeha County Lake. Fluctuations of water levels did not seem to have an effect on the net plankton populations. The benthic population in Bluff Lake is slightly higher than that found in Oktibbeha County Lake. This is true for both numbers and weight per square meter. The species composition of benthic organisms in the two lakes were similar. Tendipes, Pentoneura and Chaoborus organisms were prevalent in both lakes, and through the year for each lake. Based on one-acre samples from each lake, Bluff Lake has a more balanced fish population than does Oktibbeha County Lake. Neither, however, seems to support populations of game fish in which a high percentage of these are in the available or harvestable range. Both lakes contain high populations of gizzard shad. Bluff Lake contains a high population of small and intermediate sized white crappie and bluegill. The bass population seems low. However, other predator fish such as flathead catfish and spotted gars are found in adequate numbers to help bring the lake toward a more balanced condition.
W71-11298

PEACE-ATHABASCA DELTA SYMPOSIUM.
For primary bibliographic entry see Field 04C.
W71-11335

LAKE ATHABASCA WATER LEVELS 1930-1970,
Water Survey of Canada, Calgary (Alberta). Alberta and Northwest Territories District Office.
R. M. Bennett.
In: Proceedings of the Peace-Athabasca Delta Symposium, January 14-15, 1971, Edmonton, Canada: University of Alberta, Water Resources Center, p 32-56, May 1971. 24 p, 10 fig, 3 photo.

Descriptors: *Water levels, *Water level fluctuations, *Lakes, Water balance, Streamflow, Water storage, Regulation, Hydroelectric power, Dams, Data collections, Hydrologic data.
Identifiers: *Lake Athabasca (Canada).

Water levels on Lake Athabasca, Alberta, Canada, have been recorded at Fort Chipewyan for varying time periods since 1930, at Goldfields from 1942 to 1956, and Crackingstone Point (Gunnar Mines) since 1956. Recently, much attention has been focused on falling water levels on Lake Athabasca, related to the reduced peak flows in the Peace River caused by storage and regulation at Bennett Dam. The main purpose of this report is to consolidate all of the readily obtainable information on Lake Athabasca water levels, and to make that information available to interested users. Water levels on Lake Athabasca are presently lower than the long-term average for this time of year. Summer water levels for 1968, 1969 and 1970 are approximately comparable to the levels which occurred in 1938, 1945 and 1946, which were considered by local Chipewyan residents to be very low-water years. The major concern is that below-normal water levels will persist with continued regulation of Peace River flows. (See also W71-11335) (Knapp-USGS)
W71-11337

FACTORS CONTROLLING THE LEVEL OF LAKE ATHABASCA,
Research Council of Alberta, Edmonton. Highway and River Engineering Div.
Rolf Kellerhals.
In: Proceedings of the Peace-Athabasca Delta Symposium, January 14-15, 1971, Edmonton, Canada: University of Alberta, Water Resources Center, p 57-109, May 1971. 53 p, 26 fig, 8 tab, 10 ref.

Descriptors: *Water levels, *Water level fluctuations, *Lakes, Water balance, Streamflow, Water storage, Regulation, Hydroelectric power, Dams, Data collections, Hydrologic data.
Identifiers: *Lake Athabasca (Canada).

During the period 1968 to 1970 the summer water levels of Lake Athabasca, Canada, were 4 to 5 feet lower than they had been during the preceding 8 years, 1960 to 1967. Approximately half of this reduction is attributable to impoundment and regulation of the Peace River by B.C. Hydro's Bennett Dam, which started to affect the river flows in December 1967. The other half is the result of a change from a period of high natural runoff (1960-67) to a period of slightly below-average runoff (1968-70). The summer peak lake levels of 1968 and 1970 are the lowest on record. Since the bed materials of the outlet channels are easily erodible, the lowered Peace and Slave River levels will cause degradation in the outlet channels. As the maximum possible degradation is approximately 3 ft (corresponding to the reduced Slave River stages), the Lake Athabasca summer levels may eventually be reduced by 5 ft, although a lesser reduction of 3 to 3.5 ft is more probable. Winter levels in the main part of Lake Athabasca will probably also be reduced eventually by more than the presently observed 1 to 2 ft. (See also W71-11335) (Knapp-USGS)
W71-11338

RECENT HYDROLOGIC INVESTIGATIONS IN THE DELTA AND POSSIBLE WATER LEVEL CONTROL MEASURES,
Provincial Dept. of Agriculture, Edmonton (Alberta).. Water Resources Div.
R. E. Bailey.
In: Proceedings of the Peace-Athabasca Delta Symposium, January 14-15, 1971, Edmonton, Canada: University of Alberta, Water Resources Center, p 110-136, May 1971. 27 p, 16 fig, 9 ref.

Descriptors: *Water control, *Water levels, *Regulation, *Lakes, Weirs, Dams, Hydraulic models, Water level fluctuations, Model studies, Simulation analysis, Hydraulic models.
Identifiers: *Lake Athabasca (Canada).

Hydrologic investigations of Lake Athabasca, Canada, prior to 1970 are briefly reviewed and an indication of their relevance to present knowledge is presented. Recent investigations by the Alberta Water Resources Division are outlined, and preliminary results given. Inflow-outflow functions for the inter-connecting channels were tentatively established. Artificial control of Lake Athabasca levels is considered, and three alternative construction possibilities are discussed on the basis of preliminary design concepts. Computer simulations of the effect of the artificial controls on Lake Athabasca were carried out for 1968 and 1969. If restoration of Lake Athabasca levels to their pre-1968 regime is deemed to be necessary, some form of artificial control of lake outflow will be required. Three alternative preliminary proposals have been presented for artificial regulation of lake outflow: (1) a notched weir at the Slave River channel at a point 5.5 miles downstream of the Slave-Rochers confluence; (2-A) a notched weir at the rapids on the Riviere des Rochers at a point 10.5 miles upstream from the Slave-Rochers confluence; or (2-B) a broad-crested rock weir at the rapids on Riviere des Rochers in the same location as 2-A. (See also W71-11335) (Knapp-USGS)
W71-11339

ANALYSIS OF STREAM-TEMPERATURE VARIATIONS IN THE UPPER DELAWARE RIVER BASIN, NEW YORK,
Geological Survey, Washington, D.C.
Owen O. Williams.
For sale by Superintendent of Documents-U.S. Government Printing Office, Washington, D.C. Price: 30 Cent. Geological Survey Water-Supply Paper 1999-K, 1971. 45 p, 14 fig, 5 tab, 10 ref.

Descriptors: *Water temperature, *Delaware River, *Climates, *Reservoir operation, Reservoir storage, Stratification, Streamflow, Fish, Water quality, Discharge (water), Data Collections, Variability, New York.
Identifiers: *Stream temperature variation, *Delaware River basin.

The effect of climatic conditions and reservoir releases on downstream conditions was determined by means of statistical and graphical analyses of stream-temperature variations measured in the upper Delaware River basin, May-September 1964-67. Climatic conditions normally increase water temperatures from February through July and decrease them from August through January. Summer releases from New York City's Cannonsville Reservoir decreased water temperatures by 13 deg C in 8.1 miles and by 1 deg C, 55.9 miles downstream. Releases from New York City's Pepacton Reservoir decreased water temperatures by 11 deg C in 31.0 miles and between 1 deg-3 deg C in 71.0 miles downstream. The influence of release from these reservoirs is dependent upon five factors: Thermal stratification in the reservoir, depth at which water is withdrawn from the reservoir, rate of release, distance downstream from the reservoir, and climatic conditions. (Knapp-USGS)
W71-11350

THE ECONOMICS OF QUANTITY VS QUALITY IN GREEN BAY,
Wisconsin Univ., Madison. Marine Studies Center.
Victor L. Arnold.
In: Proceedings of the Thirteenth Conference on Great Lakes Research, April 1970, Buffalo, New York, International Association, Great Lakes Research, p 141-144. 5 ref.

Descriptors: *Lake Michigan, *Estuaries, *Water resources, *Management, *Economics, Water utilization, Water pollution, Planning.
Identifiers: Green Bay.

Physical, chemical, biological and socio-economic research is being integrated through systems analysis to identify and measure in physical and economical terms the interrelationships between resource use and abuse and the environment of Green Bay, an estuary of Lake Michigan. Public policy recommendations and development of alternatives to allow public decision and policy makers, to be more fully aware of quantity vs quality are included in this analysis. (See also W71-11474) (Ensign-PAI)
W71-11473

MIXING PROCESSES IN GREEN BAY,
Wisconsin Univ., Madison. Marine Studies Center.
W. F. Ahrnsbrak, and R. A. Ragotzkie.
In: Proceedings of the Thirteenth Conference on Great Lakes Research, April 1970, Buffalo, New York, International Association Great Lakes Research, p 880-890. 8 fig, 3 tab, 14 ref.

Descriptors: *Lake Michigan, *Water pollution, *Mixing, *Diffusion, *Seiches, Rivers, Runoff, Suspended load, Chlorides, Evaporation, Precipitation.
Identifiers: Green Bay, Electrical conductivity, Light transmissivity.

Based on the principle of conservation of mass, effective longitudinal diffusivities are calculated using a one-dimensional diffusion model for Green Bay in Lake Michigan. Diffusivities are compared with those predicted on the basis of seiche activity,

shown to be mainly responsible for the observed concentration field. Electrical conductivity and light transmissivity are used to observe the distribution of Fox River water in the Bay. (See also W71-11473) (Ensign-PAI)
W71-11474

A VISUAL DEMONSTRATION OF THE BENEFICIAL EFFECTS OF SEWAGE TREATMENT FOR PHOSPHATE REMOVAL ON PARTICULATE MATTER PRODUCTION IN WATERS OF LAKES ERIE AND ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.; and Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 05C.
W71-11507

LONG-TERM CHANGES IN THE LIMNOLOGY AND MACROZOOPLANKTON OF A LARGE BRITISH COLUMBIA LAKE,
British Columbia Dept. of Recreation and Conservation, Victoria. Fish and Wildlife Branch.
For primary bibliographic entry see Field 05C.
W71-11523

ARSENIC AND PHOSPHATE: MEASURED BY VARIOUS TECHNIQUES,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 05A.
W71-11525

LAKE ERIE PHYSICAL LIMNOLOGY CRUISE, MIDSUMMER 1967,
Ohio Dept. of Natural Resources, Columbus. Div. of Geological Survey.
For primary bibliographic entry see Field 05C.
W71-11551

BACTERIAL POPULATION OF HUMIFIED LAKES,
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 05C.
W71-11555

2I. Water in Plants

COMPARATIVE WATER LOSS OF DOUGLAS-FIR AND OREGON WHITE OAK,
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 02D.
W71-11063

SOME PROPERTIES OF ROOT SYSTEMS OF BOTTOM LAND WILLOWS AND POPLARS,
Institut za Vodoprivredu Jaroslav Cerni, Belgrade (Yugoslavia).
B. Rula.
TT69-51009/2 Translated from Serbo-Croatian. Available from US Dept. of Commerce, Nat. Tech. Inf. Service, Springfield, Va. 22151. Transactions, Institute 'Jaroslav Cerni', Vol 15, No 46, p 35-40, 1969. 6 p, 3 fig, 5 tab, 4 ref.

Descriptors: *Soil-water-plant relationships, *Flood plains, *Willow trees, *Phreatophytes, Infiltration, Consumptive use, Evapotranspiration, Ecology, Forests.
Identifiers: *Danube River.

Observations and measurements in the Danube flood plain of representative specimens of Salix alba L. of the same age (20 years) showed clearly that moisture regime in the flood plain influenced their development. The minimum depth of the aerated layer of the rhizoshere was 45 cm. The main root penetrated to a depth of over 1.0 m and the surface root system was very well developed, in mass and construction equalling that of poplars. The composition and pattern of the woods, tilling and improvement of the soil, drainage of depressions, etc., are factors which affect the development of stands and the structure of the root system. In places with high groundwater and surface water the white willow woods give way to Salicetum triandre Malc., and marsh plants. (Knapp-USGS)
W71-11138

MYCOLOGICAL STUDIES IN BARATARIA BAY, LOUISIANA, AND BIODEGRADATION OF OYSTER GRASS, SPARTINA ALTERNIFLORA.
Louisiana State Univ., Baton Rouge. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 02L.
W71-11277

GROWTH OF SPARTINA PATENS AND S. ALTERNIFLORA AS INFLUENCED BY SALINITY AND SOURCE OF NITROGEN,
Louisiana State Univ., Baton Rouge. Dept. of Botany.
For primary bibliographic entry see Field 02L.
W71-11282

DIVERSE - A FORTRAN IV PROGRAM TO CALCULATE DIVERSITY INDICES OF STREAM BOTTOM ORGANISMS,
Massachusetts Univ. Amherst, Water Resources Research Center.
For primary bibliographic entry see Field 07C.
W71-11313

2J. Erosion and Sedimentation

A STUDY OF NATURAL WIGGLY LINES IN HYDROLOGY,
Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
A. K. Ghosh, and A. E. Scheidegger.
Journal of Hydrology, Vol 13, No 2, p 101-126, June 1971. 26 p, 4 fig, 7 tab, 10 ref.

Descriptors: *Meanders, *Terrain analysis, *Geomorphology, *Stochastic processes, *Statistical models, Model studies, Statistics, Statistical methods, Rivers, Coasts, Probability, Watersheds (Basins), Distribution patterns, Watersheds (divides).
Identifiers: Stochastic models.

The statistical characteristics of two river meander trains, two stretches of coast lines, and one watershed line were investigated. An attempt was made to produce these characteristics by stochastic model. To this end, the chain model previously applied to meanders was generalized. The required ensembles can be generated, if both the sinuousity and the 'degree of wiggliness' (a new quantity defined in the paper) are specified. Natural hydrological wiggly lines are nothing but constrained random lines for which the sinuousity and the degree of wiggliness are given.
W71-11068

SAMPLING PROCEDURES FOR COARSE FLUVIAL SEDIMENTS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
Rolf Kellerhals, and Dale I. Bray.
Journal of the Hydraulics Division, ASCE Proceedings, Vol 97, No HY8, Paper 8279, p 1165-1180, August 1971. 16 p, 10 fig, 4 tab, 14 ref.

Descriptors: *Sampling, *Sediments, *Alluvium, *Gravels, *Alluvial channels, Particle size, Analytical techniques, Streams, Statistics, Statistical methods, Data collections.
Identifiers: Coarse fluvial sediments, *Particle size analysis.

Procedures for sampling the bed material of gravel-bed rivers consist of five independent steps: selection of site and time, collection of a sample, determination of grain size, computation of size distribution, and presentation of results. Because several choices of methods are available at each step, much confusion exists in the literature. Simple geometric arguments, illustrated with a model based on densely packed cubes, are used to develop weighting factors to convert from one sampling procedure to another. Comparison with several sets of field data shows that the conversion method is applicable to gravel deposits. Differences remaining after conversion are attributable to random differences between samples, or to population differences. The grid-by-number procedure is the only surface-oriented procedure directly comparable to customary bulk sieve analysis. It is therefore correct sampling procedure for the study of surface-dependent phenomena. Additional field data are presented to compare three equivalent procedures.
W71-11075

SEDIMENT DISPERSION IN FLOW WITH MOVING BOUNDARIES,
Utah Water Research Lab., Logan.
Chen-lung Chen.
Journal of the Hydraulics Division, ASCE Proceedings, Vol 97, No HY8, Paper 8287, p 1181-1201, August 1971. 21 p, 1 fig, 38 ref, append.

Descriptors: *Sediment transport, *Dispersion, *Alluvial channels, *Scour, Stream erosion, Sedimentation, Bed load, Suspended load, Equations, Mathematical models, Turbulent flow, Laminar flow.
Identifiers: *Sediment dispersion.

The longitudinal dispersion equation for sediment in unsteady nonuniform flow with moving boundaries is formulated from the three-dimensional instantaneous diffusion equation for movement of sediment by means of the time- and space-averaging processes. The equation is then studied for its applicability and validity in the sediment problem. The analytical expressions of the longitudinal dispersion coefficient for sediment in flow with moving boundaries are obtained for both turbulent and laminar flow. The effect of moving boundaries in turbulent flow on the value of the longitudinal dispersion coefficient is theoretically negligible, but may be significant at a place where a sand or water wave breaks, causing an infinite gradient of bed or flow profile. The longitudinal dispersion equation that may be called the suspended-load equation plays an important role in the mathematical modeling of an alluvial channel where the suspended bed-material discharge is greater than the contact-bed discharge.
W71-11076

INFLUENCES OF SEDIMENTATION ON WATER QUALITY: AN INVENTORY OF RESEARCH NEEDS.
For primary bibliographic entry see Field 05C.
W71-11077

QUANTITATIVE DISTRIBUTION OF SUSPENDED MATTER IN THE DEEP WATERS OF THE NORTHERN AND CENTRAL INDIAN OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
Ye. I. Gordeyev.
Oceanology, Vol 10, No 1, p 56-63, 1970. 8 p, 2 fig, 8 ref.

Descriptors: *Suspended load, *Indian Ocean, Sampling, Data collections, Water quality, Suspension, Provenance, Continental shelf, Surveys, Distribution patterns, Currents (Water), Ocean circulation, Ocean currents, Sedimentation.

The membrane ultrafiltration technique was used to collect suspended matter on a series of sampling

transverses in the Indian Ocean. One-liter samples were filtered through an ultrafilter with a pore diameter of 0.7 microns. The vertical distributions of the suspensions were nonuniform. Waters of the arid parts of the ocean, especially the Gulf of Aden and the Arabian Sea, contain the smallest amounts of suspension particles (less than 0.5 mg/liter). The amount of suspension increases sharply near the mouths of major rivers, and at the base of the continental slope (1.0-2.5 mg/liter and more). The distribution of suspended matter in the uppermost active layer of the ocean is quite complex. Deep waters in the central Indian Ocean usually contain 0.5-1.0 mg/liter of suspension. Suspension distribution depends on the peculiarities of terrigenous and biogenous material supply.
W71-11094

DISTRIBUTION AND COMPOSITION OF WATER SUSPENSIONS IN THE NORTHERN AND CENTRAL PARTS OF THE INDIAN OCEAN,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
Yu. A. Bogdanov, O. G. Kozlova, and V. V. Mukhina.
Oceanology, Vol 10, No 1, p 64-73, 1970. 10 p, 6 fig, 3 tab, 17 ref.

Descriptors: *Suspended load, *Indian Ocean, Sampling, Data collections, Water quality, Suspension, Provenance, Continental shelf, Surveys, Distribution patterns, Currents (Water), Ocean circulation, Ocean currents, Sedimentation.

Suspended matter was collected by separation and membrane filtration from the Indian Ocean surface and from various deeper water levels. The suspension is distributed nonuniformly in the surface waters. Suspension content peaks along the coast and, in the open central regions, in zones in which planktonic organisms flourish. Two types of vertical suspension distribution are established on the basis of its material composition. The various components of the suspensions, siliceous, carbonate, and terrigenous, their distribution, and their role in the sedimentation process are described.
W71-11095

SEDIMENTATION AT THE HEAD OF A SUBMARINE CANYON,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
E. S. Trimonis, and K. M. Shimkus.
Oceanology, Vol 10, No 1, p 74-85, 1970. 12 p, 3 fig, 2 tab, 12 ref.

Descriptors: *Turbidity currents, *Sedimentation, *Continental shelf, *Continental slope, *Canyons, Sedimentary structures, Stratigraphy, Sediment transport, Deposition (Sediments), Particle size, Sands, Bed load, Suspended load, Alluvium, Provenance, Suspension.
Identifiers: *Submarine canyons.

Data on the distribution of sediment at the head of the Inguri submarine canyon (Black Sea) are presented. Terrigenous coarse-clastic and coarse-granular sediments (pebbly-gravel deposits, sands, coarse aleurites) accumulate in the canyon bed, and muddy sediments on its walls. The deposits have a rhythmic structure in the bed of the submarine canyon. The sedimentary material in the submarine canyon is composed basically of river debris. The general features of the sedimentation process in the submarine canyon are correlated with the stages of the Inguri River.
W71-11096

BASEMENT RELIEF AND THICKNESS OF BOTTOM SEDIMENTS IN THE CENTRAL PART OF THE SEA OF JAPAN,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
A. F. Beresnev, and V. M. Kovylin.
Oceanology, Vol 10, No 1, p 86-88, 1970. 3 p, 3 fig, 3 ref.

Descriptors: *Bottom sediments, *Topography, *Oceanography, Sedimentation, Sampling, Surveys, Data collections, Seismic studies, Sediment transport, Deposition (Sediments).
Identifiers: *Sea of Japan.

Maps of the bedrock relief and of the thickness distribution of bottom sediments were constructed on the basis of seismic investigations by the Institute of Oceanology in the Sea of Japan. A relationship was established between the sedimentary mantle and the depth of the surface of the primary tectonic relief. Maximum sediment thicknesses were confined to regions with the deepest basement, whereas basement hills are covered by thinning sediments or may be bare.
W71-11097

SOME FEATURES OF CONTEMPORARY DEVELOPMENT OF THE NORTHWESTERN BLACK SEA SHORE,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
Yu. D. Shuyskiy.
Oceanology, Vol 10, No 1, p 89-95, 1970. 7 p, 3 fig, 17 ref.

Descriptors: *Shores, *Beaches, *Sedimentation, *Beach erosion, Littoral drift, Water level fluctuations, Sands, Sand bars, Dunes, Estuaries, Provenance, Sediment transport, Lagoons, Coasts, Surf, Sea level.
Identifiers: *Black Sea.

The northwestern Black Sea shore is a classical example of the shoreline of submergence. Recent lagoon development is closely associated with sediment sources, the volumes of littoral drift, shore exposures to prevailing winds and waves, and is independent of the rate of relative water level fluctuations in the Black Sea. There are five dynamic areas where unusual features of littoral drift development leave their mark on the outer appearance of barriers. Data are given on the volume of littoral drift and on the share of each source of material supply.
W71-11098

ABRASION OF THE FLYSCH SHORE OF THE BLACK SEA,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
N. V. Yesin, and M. T. Savin.
Oceanology, Vol 10, No 1, p 96-100, 1970. 5 p, 1 fig, 1 tab, 10 ref.

Descriptors: *Erosion, *Shores, *Beach erosion, *Geomorphology, Land forming, Slopes, Topography, Geologic control, Sandstones.
Identifiers: *Black Sea, *Flysch, *Cliff erosion.

Observations were made from 1962 to 1966 on the natural decay of flysch rocks in a stretch of the Black Sea shore. There is no definite relationship between the rate of flysch abrasion and depth in the wave breaker zone. Under certain conditions there is no relationship between the abrasion rate and the force of wave action. The abrasion rate in a given area depends on several other factors, such as the presence of pebbles, their sizes, and the thickness of the pebble layer. The destruction of flysch layers occurs only under the abrasive action of clastic material. Where there is no such material, the rate of abrasion is very low, practically zero. The average rates of destruction of the flysch rocks, as computed from the tabulated data, ranged from 0 to 8 mm/year. (Knapp-USGS)
W71-11099

FLUVIAL DIFFERENTIATION OF THE BASIN OF LAKE VICTORIA,
Makerere Univ. Coll., Kampala (Uganda). Dept. of Geography.
J. P. B. M. Ouma.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 219-251, 1970. 33 p, 12 fig, 4 tab, 31 ref.

Descriptors: *Geomorphology, *Drainage patterns (Geologic), *Terrain analysis, *Drainage density, *Channel morphology, Lakes, Rivers, Runoff, Land development, Flood control, Reservoir design, Regression analysis, Topography, Water resources development, River basin development.
Identifiers: *Stream order, *Drainage texture, *Lake Victoria (Africa).

Catchment texture, catchment shape, and stream length propagation ratio were calculated for the basin of Lake Victoria, Africa. The slope of a regression line (the regression coefficient), in an exponential number/order correlation, is the logarithmic transformation of the mean bifurcation ratio for a given stream network. Linear transformation of this slope is the stream number propagation ratio. Likewise, the mean stream length propagation ratio is the linear transformation of the logarithmic regression coefficient from an exponential correlation between mean stream length and order. High mean bifurcation ratio is indicative of low values of the mean length propagation ratio. There is no significant correlation between catchment texture and catchment order, but the larger the catchment area, the coarser the texture. However, the higher the stream order, the lower the stream frequency. In relation to catchment area, circularity of a drainage basin increases hyperbolically to a maximum value of inflection, beyond which point circularity decreases parabolically before approaching zero at infinity. Fine texture is concomitant with a high mean length propagation ratio. Texture is a more effective index of fluviomorphological differences among drainage basins than is circularity. (Knapp-USGS)
W71-11107

CLASSIFICATION OF RECENT MARINE SEDIMENTS BY PARTICLE SIZE (K voprosu klassifikatsii sovremennykh morskikh osadkov po granulometricheskomu sostavu),
Leningrad State Univ. (USSR).
A. Ye. Rybalko.
Leningradskiy Gosudarstvennyy Universitet Vestnik No 6, Seriya Geologiya i Geografiya, No 1, p 41-47, March 1971. 7 p, 1 fig, 5 tab, 18 ref.

Descriptors: *Sediments, *Sedimentation rates, *Classification, *Particle size, Sedimentary rocks, Grading, Sands, Silts, Clays, Bottom sediments, Gravels, Boulders.
Identifiers: *USSR, Nomenclature, Pebbles.

The problem of developing standards for classifying recent marine sediments and of establishing specifications for particle size is examined in the light of expanded geological investigations. A critical analysis is made of various particle size classifications, including the system developed by the Scientific Research Institute of Arctic Geology based on sand-silt-clay ratios. The scale of particle sizes suggested by the classification of L. B. Rukhin is recommended for use by the author. A TRILINEAR SCHEME FOR SAND, SILT AND CLAY SEDIMENTS IS PROPOSED. The scheme provides clarity of representation and ensures rapid processing and correlation of the data of others for determining sediment gradations and for differentiating sediment groups in sufficient detail to prepare various-scale maps of bottom sediments. (Josefson-USGS)
W71-11114

RIVER TERRACES AND CHARACTERISTICS OF RECENT SEDIMENT ACCUMULATION IN MOUNTAIN VALLEYS AS ILLUSTRATED BY THE CRIMEAN MOUNTAINS (Rechnyye terrasy i osobennosti sovremennoy akkumulyatsii v gornykh dolinakh na primere Gornogo Kryma),
Lenigrad State Univ. (USSR).
Nguen Kuang Mu.
Leningradskiy Gosudarstvennyy Universitet Vestnik No 6; Seriya Geologiya i Geografiya, No 1, p 135-141, March 1971. 7 p, 12 ref.

Descriptors: *Terraces (Geological), *Alluvium, *Sediments, *Structural geology, Talus, Colluvi-

um, Geomorphology, Quaternary period, Erosion, Flood plains, Detritus, Aggradation, Stratigraphy, Orography.
Identifiers: *USSR, *Crimea, *Uplifts, Downcutting, Mountain valleys, Alluvial fans, Tectonic movements.

The role of talus and colluvium in the alluvial structure of Crimean Mountain valleys is examined in connection with geomorphological investigations conducted in 1962-66 and again in 1969. The talus, colluvium and alluvium on floodplains and terraces of the mountain valleys are interrelated and form a complex of detrital material in both the mountain and lowland valleys. Uplifts formed during the Quaternary period and changes in climatic conditions have resulted in gradual downcutting by rivers and in the formation of numerous river terraces of varying elevation. Absolute and relative elevations of the terraces increase upstream along the river valleys, which attests to the unique rise of the Crimean Mountains. The river valley terraces are of the aggradational type; bedrock is observed only in the upper reaches of the valleys. The alluvium becomes coarser in the upper reaches and gradually finer in the lower reaches. The alluvium accumulation of the river terraces conforms to the transgressions of the Black Sea basin; hence, the river terraces of the Crimean Mountains may be compared with sea terraces. (Josefson-USGS)
W71-11115

HYDROGEOCHEMICAL AND HYDRODYNAMIC PATTERNS IN KARST FORMATION (Gidrogeokhimicheskiye i gidrodinamicheskiye zakonomernosti razvitiya karsta),
Akademiya Nauk SSSR. Institut Geologii.
F. A. Makarenko, and V. P. Zverev.
Akademiya Nauk SSSR Doklady, Vol 192, No 3, p 626-628, 1970. 3 p, 9 ref.

Descriptors: *Karst, *Subsurface runoff, *Groundwater movement, *Earth-water interfaces, Hydrogeology, Geomorphology, Petrography, Rocks, Groundwater, Thermodynamics, Aqueous solutions, Water chemistry, Geochemistry, Subsurface flow, Base flow, Erosion.
Identifiers: *USSR, Caucasus, Soviet Central Asia, Russian platform, Hydrogeochemistry, Water exchange, Tectonics.

Karst formation, which represents the interaction of natural water and soluble rock at their interface, comprises three separate processes: the inflow of solvent to the solid surface, the actual process of solution or phase transition, and the removal of the solutes from the interface. Three typical zones of karst formation, corresponding to three principal zones of subsurface runoff, may be distinguished: an upper zone of active 'soil' runoff and intense karst formation above the level of local erosion; a middle zone of slower runoff and unusual karst formation lying below the level of local erosion but above the level of regional downcutting by the river or the sea; and a lower zone of extremely slow runoff with weak karst formation. Karsts of the upper zone are common and initially small; karsts of the middle zone are more sporadic and predominately horizontal; karsts of the lower zone are very scattered and local in extent. The relative karst formation rates for the upper, middle and lower zones, based on a study of subsurface and chemical runoff in the Caucasus, Soviet Central Asia and on the Russian platform, are 1.0, 0.1-0.01, and 0.001-0.0001 or less, respectively. It may be concluded that lithologic, tectonic, geomorphologic and other patterns of karst formation discussed in the literature largely determine the type, properties and rate of movement of groundwater in the earth's crust; the intensity of karst formation depends directly on groundwater dynamics. (Josefson-USGS)
W71-11118

ORIENTATION OF SAND GRAINS IN SEDIMENTS OF VARIED ORIGIN AS ILLUSTRATED BY OBOLUS SAND OF THE BALTIC REGION (Ob orientirovke peschinok v otlozheniyakh razlichnogo genezisa na primere obolovykh peskov Pribaltiki),
Vsesoyuznyi Geologicheskii Institut, Leningrad (USSR).
L. N. Kulyamin.
Akademiya Nauk SSSR Doklady, Vol 198, No 1, p 169-171, 1970. 3 p, 3 fig, 7 ref.

Descriptors: *Sediments, *Particle size, *Particle shape, Sediment transport, Deposition (Sediments), Sands, Channel morphology, Saltation, Sedimentary basins (Geological), Distribution patterns, Channel flow.
Identifiers: *USSR, Baltic Sea, Paleogeography, Grains (Sand), Cross bedding.

The distribution patterns of sand grains in Baltic Sea area sediments of varied origin are examined in terms of orientation of their pointed tips. The number of grains sufficient to give a representative orientation pattern was determined experimentally in series of 100, 150, 200, 250, and 300 grains. An average number of 200 to 220 grains was measured in each of the 16 samples studied. The facies of these sediments were determined by noting the morphology of cross bedding and by grain-size analysis. Two types of grain-tip orientation were identified--littoral and channel. In the littoral type, pointed grain tips were oriented predominately in the cross-bedding direction (in the direction of flow). In the channel type, pointed grain tips were oriented predominately in a direction opposite to the cross bedding. A specific pattern of sand-grain orientation was observed in each of the two facies types. Hence, sediment facies may be determined by the orientation of sand grains in conjunction with other textural and structural features of sediments such as cross bedding and grain size. (Josefson-USGS)
W71-11119

ACTION OF SUSPENDED PARTICLES ON THE SOLID BOUNDARIES OF FLOW (O vozdeystvii chastits vzvesi na tverdyye granitsy potoka),
V. V. Moskvitin, and A. Ye. Smoldyrev.
Akademiya Nauk SSSR Doklady, Vol 181, No 2, p 335-338, 1968. 4 p, 2 fig, 1 ref.

Descriptors: *Suspended load, *Suspension, *Boundaries (Surfaces), *Flow, *Flow rates, Particle size, Roughness (Hydraulic), Plastic deformation, Bearing strength, Sediment transport.
Identifiers: *USSR, Hydraulic mixtures, Stream competence, Kinematics.

The results of measurements of the action of hydraulic mixtures with spherical particles and ground rocks (0.5 to 15-20 mm) on the solid boundaries of flows are examined. Data on the individual and mass action of particles on the inner surfaces of the flow were obtained by a combined method (piezoelectric transducers, motion-picture filming of labeled particles and microphotography of surfaces) in pipes at mean flow velocities of 1.8 to 5 m/sec and folume concentrations of 0 to 30%. An examination is made of the mechanism of this action, which is based on the oblique impact of particles with extremely short contact time (millionths of a second) and considerable force at the local contact. Graphs showing the distribution of a number of impacts for different flow conditions are given, accompanied by an analysis of the various examples of action formation kinematics. (Josefson-USGS)
W71-11128

GEOLOGY AND GEOCHEMICAL EXPLORATION OF THE VIENNA DISTRICT, BLAINE AND CAMAS COUNTIES, IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
Spencer S. Shannon, Jr.
Idaho Bureau of Mines and Geology, Pamphlet 146, January 1971. 45 p, 1 fig, 4 plate, 1 tab, 67 ref.

Descriptors: *Geology, *Sedimentation, *Geochemistry, *Exploration, *Idaho, Sediment transport, Flood plains, Alluvial channels, Streamflow, Mining, Chemical analysis.

A geologic and geochemical study of the Vienna district in the Sawtooth Mountains of south-central Idaho was made to determine the usefulness of geochemical exploration techniques in the revaluation of a dormant metal-mining district. Active stream-bed and floodplain sediments were sampled near the mouths of first- and second-order tributaries. Cold-extraction tests for ammonium citrate-soluble heavy metals were run on all samples. Two cold-extraction copper tests were compared on selected samples; the test using dithizone in petroleum ether as a collector was slightly more sensitive than the test using 2,2'-biquinoline in isoamyl alcohol. Specific total-extraction tests for copper and zinc were made on selected samples. Field tests with cold ammonium citrate were conducted upstream from sample sites. Anomalous sources found include limonite-stained quartz veinlets and organic sediments. The relative reliability and effectiveness of several types of field and laboratory sampling procedures and geochemical tests were compared. The information obtained may facilitate selection of satisfactory procedures and tests for use in mining districts that have similar lithology, mineralogy, climate and vegetation.
W71-11133

INVESTIGATIONS INTO THE RELATIONS BETWEEN BEDLOAD TRANSPORT AND CHANNEL SHAPE,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
David N. Wilcock.
Geological Society of America Bulletin, Vol 82, No 8, p 2159-2175, August 1971. 17 p, 18 fig, 3 tab, 17 ref.

Descriptors: *Sediment transport, *Bed load, *Streamflow, *Channel morphology, *Alluvial channels, Discharge (Water), Sediments, Particle size, Alluvium, Sedimentation, Water levels, Sediment load, Tractive forces, Stage-discharge relations.
Identifiers: River Hodder (England).

For a small upland catchment in the Pennines, England, measurements of discharge, channel shape, and bedload movement were combined to relate hydraulic geometry characteristics to that fraction of the coarse bedload which, under prevailing hydrological conditions is capable of movement. Different combinations of the exponents related to the rates of increase of width, depth, and velocity with discharge, are related to varying rates of increasing and decreasing competence. Coarse bedload constitutes a very large fraction of the total load in streams of the type described, and its role in channel formation must be considerable and distinctive. That fraction which cannot be transported because its size exceeds bankfull competence is residual and its role is essentially passive, possibly influencing channel slope to a marked degree. That fraction falling within bankfull competence and therefore theoretically capable of movement is probably of only transitory importance as a slope-forming factor. The relations between movable bedload and discharge, channel shape, and flow characteristics are proposed as empirical descriptions. With increasing discharge, competence will tend to increase only when the rate of increase in velocity equals or exceeds the rate of increase in depth. (Knapp-USGS)
W71-11206

SEDIMENTARY FACIES PATTERNS AND GEOLOGIC HISTORY OF A HOLOCENE MARINE TRANSGRESSION,
Delaware Univ., Newark. Dept. of Geology.
John C. Kraft.
Geological Society of America Bulletin, Vol 82, No 8, p 2131-2158, August 1971. 28 p, 26 fig, 1 tab, 20 ref.

Descriptors: *Sedimentation, *Stratigraphy, *Sediment transport, *Coasts, Beaches, Marshes, Coastal plains, Sea level, Water level fluctuations, Delaware, Quaternary period, Geologic formations.
Identifiers: *Sedimentary facies.

Studies of Holocene sediments in coastal Delaware show complex sediment distribution patterns resulting from lateral and vertical movement of successive environments of deposition over a Pleistocene unconformity. These sediments are infilling a drowned topography with a local relief of 70 ft and possibly up to 125 ft, eroded on highly variable Pleistocene sediments. Larger depositional features forming around eroding Pleistocene headlands and infilling the estuaries include characteristic shoreline environments, such as spits, dunes, baymouth barriers, an intermeshing network of tidal deltas, nearshore marine erosional-depositional sands and gravels, and lagoons or estuaries with fringing marshes which form the westernmost edge of the transgressive units. The thickness and areal extent of the sedimentary bodies are to a large degree controlled by the morphology of the Pleistocene unconformity. A large portion of the Holocene sedimentary units is being eroded by the transgressing Atlantic Ocean. The depositional units are thin, highly irregular in areal extent, extremely variable in thickness, and difficult to project. Sedimentary processes active in the shallow bays include shoreline marsh erosion and the formation of thin, possibly ephemeral, beach-dune washover complexes consisting of clean, well-sorted sand, with typical beach and washover sedimentary structures. (Knapp-USGS)
W71-11207

WATER-TABLE EFFECTS ON SEACOASTS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02F.
W71-11209

CHARACTERISTICS OF LIMESTONE SOLUTION IN THE SOUTHERN ROCKY MOUNTAINS AND SELKIRK MOUNTAINS, ALBERTA AND BRITISH COLUMBIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geography.
D. C. Ford.
Canadian Journal of Earth Sciences, Vol 8, No 6, p 585-609, June 1971. 25 p, 15 fig, 3 tab, 42 ref.

Descriptors: *Karst, *Water chemistry, *Limestones, Carbon dioxide, *Carbonates, Caves, Springs, Solutes, Aqueous solutions, Groundwater movement, Discharge (Water), Surface-groundwater relationships, Rocky Mountain Region, Hardness (Water), Water temperature, Hydrogen ion concentration, Carbonate rocks.
Identifiers: *Canada.

The temperature, pH, and carbonate hardness of 415 water samples were determined in four limestone areas in the southern Rocky Mountains and Selkirk Mountains of Canada. Sampling covered all of the major carbonate rock formations of the region, ranged across the floral lifezones and included surface and sub-surface examples. In the forest zone at Crowsnest Pass, solute concentration in a major karst spring was inversely proportional to discharge; solute concentrations in a nearby creek and lake showed little variation with discharge. In tundra and alpine desert zones at Mt. Castleguard, solute concentrations were lower than in the forest, and marked depletion of CO2 was indicated in some restricted cases. In the Maligne River basin, limestone forest and tundra waters were also different. Solute concentration in the trunk river and in lakes and underground channels along its course were determined by the mixing of karst and non-karst waters. At the Nakimu Caves there is a strong contrast between limestone seepage waters and allogenic streams. The forest waters compare with those from temperate and tropical forested karsts and indicate CO2 enrichment from soil air sources. The tundra waters are similar to those of the Alps and an arctic tundra. Large cave streams remain very aggressive after lengthy and rough passages through limestone. The ratio CaCO3:MgCo3 in most of the karst waters is close to 2.5:1. (Knapp-USGS)
W71-11214

METHODS EMPLOYED IN STUDYING THE MIXING MECHANISM AT THE CONFLUENCE OF THE BROAD AND SALUDA RIVERS, COLUMBIA, SOUTH CAROLINA,
South Carolina Univ., Columbia.
Barbara Molnia.
South Carolina Division of Geology Geologic Notes, Vol 15, No 2, p 29-38, June 1971. 10 p, 4 fig, 8 ref.

Descriptors: *Suspended load, *Sampling, *Data collections, Sediments, Mixing, Water quality, Sedimentation, Sediment load, South Carolina, Turbidity, Rivers, Color, Water temperature.
Identifiers: Columbia (SC), *Broad River (SC), *Saluda River (SC), Specific conductance.

The mixing mechanism active at the confluence of two rivers in Columbia, South Carolina is investigated by analyzing the suspended sediment load, color, turbidity, temperature and specific conductance of the waters as they mix. River samples are taken across the mixing zone from the three bridges. Samples are obtained using a U.S. Geological Survey DH-59 depth-integrating sediment sampler. This sampler continuously collects and accumulates the sample as it is lowered to the bottom of the river and raised back to the water surface. Such a sample should give a vertical representation of the river throughout the water column at that particular river station. At each station, temperature and depth of water measurement are taken. In the laboratory, turbidity, specific conductance, color, and suspended sediment load measurements are made. (Knapp-USGS)
W71-11222

HEAVY MINERALS OF WANDO BAR AND SANDY ISLAND (PLEISTOCENE) GEORGETOWN COUNTY, SOUTH CAROLINA,
Stetson Univ., Deland, Fla.; and State Univ. of New York, Buffalo.
Michael Kaldor, and Charles J. Cazeau.
South Carolina Division of Geology, Geolgoic Notes, Vol 15, No 2, p 23-28, June 1971. 6 p, 3 fig, 2 ref.

Descriptors: *Weathering, *Beaches, *Mineralogy, *South Carolina, *Sediments, Sands, Sedimentation, Stratigraphy, Sampling, Dating, Provenance.
Identifiers: *Heavy-mineral deposits.

Wando Bar and Sandy Island are two marine constructional features of Pleistocene age located in Georgetown County, South Carolina. The heavy mineral suites in the sands of these features were compared with those of the nearby modern beaches. The heavy mineral suites in Quaternary features become impoverished in unstable heavy minerals with increasing age. This is probably because of chemical attack under the climatic conditions prevailing in the southeastern United States. The more stable minerals, notably zircon and sillimanite, resist such attack and become relatively enriched with the loss of associated unstable minerals. (Knapp-USGS)
W71-11223

PARTICLE SIZE EFFECT ON THE REACTION GOETHITE — HEMATITE .. WATER,
Pennsylvania State Univ., University Park. Dept. of Geochemistry and Mineralogy.
Donald Langmuir.
American Journal of Science, Vol 271, No 2, p 147-156, 1971. 10 p, 3 fig, 29 ref.

Descriptors: *Equilibrium, *Water chemistry, *Iron oxides, *Weathering, *Diagenesis, Chemical reactions, Thermodynamics, Entropy, Free energy, Temperature, Humidity, Pressure, Particle size.
Identifiers: *Hematite, *Goethite.

Measurements of differential heat of solution as a function of goethite and hematite surface areas and entropy measurements permit the calculation of equilibrium conditions as a function of hydrostatic pressure or relative humidity, temperature, and particle size. Such calculations give temperatures of 81 deg and 143 deg C at 1 bar and at 4 kb water pressure, respectively, for equilibrium between coarse-grained goethite and hematite. For equilibrium between hypothetical fine goethite (cubes of 0.1 micron edge length) and coarse-grained hematite, the PH20-T curve, up to 4 kb water pressure is about 80 deg C lower than the curve for the curve for the coarse-grained oxides. Thus, because most fresh goethite is smaller than 0.1 micron, it has no stability relative to coarse-grained hematite under geologic conditions. Kinetic as well as particle size effects are a major control on the occurrence of goethite and hermatite in sediments and soils. Most natural ferric oxyhydroxides are precipitated from an aqueous phase highly supersaturated with respect to both goethite and hematite. Goethite may precipitate directly at low temperatures and pressures, but hematite usually forms by long-term aging of amorphous material or by dehydration. Although goethite may dehydrate to give hematite, rehydration or hematite is kinetically unfeasible. (Knapp-USGS)
W71-11224

ORGANIC CHELATION OF Co-60 AND Zn-65 BY LEUCINE IN RELATION TO SORPTION BY SEDIMENTS,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.
For primary bibliographic entry see Field 02K.
W71-11241

CHANNEL PROCESSES ON REGULATED NAVIGABLE RIVERS (Ruslovyye protsessy na sudokhodnykh rekakh s zaregulirovannym stokom),
For primary bibliographic entry see Field 08B.
W71-11331

SEDIMENT DISCHARGE OF RIVERS AND THE FORMATION OF THE MARITIME TERRITORY SEACOAST (Tverdyy stok rek i formirovaniye morskikh beregov Primor'ya),
For primary bibliographic entry see Field 02L.
W71-11334

GEOLOGY AND GEOLOGIC HISTORY OF THE PEACE-ATHABASCA DELTA AREA: A SUMMARY,
Research Council of Alberta, Edmonton. Geology Div.
For primary bibliographic entry see Field 04C.
W71-11336

DEVELOPMENT OF BARRIER ISLAND LAGOONS: WESTERN GULF OF MEXICO,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02L.
W71-11342

TRANSITING COASTAL RIVER CHANNELS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 08B.
W71-11343

ANALYSIS OF MAJOR RIVER SYSTEMS AND THEIR DELTAS: PROCEDURES AND RATIONALE, WITH TWO EXAMPLES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02E.
W71-11344

SEDIMENT IN A MICHIGAN TROUT STREAM--ITS SOURCE, MOVEMENT, AND SOME EFFECTS ON FISH HABITAT,
Forest Service (USDA), Cadillac, Mich. North Central Forest Experiment Station.
Edward A. Hansen.

Forest Service Research Paper NC-59, 1971. 14 p, 17 fig, 3 tab, 14 ref.

Descriptors: *Aquatic habitats, *Sediment load, *Sediment transport, *Erosion, *Channel improvement, Bank stabilization, Sands, Sedimentation, Sediment discharge, Sediment distribution, Trout, Fishing, Environment, Michigan, Water quality, Sampling, Water pollution effects.
Identifiers: *Trout streams.

A sediment budget was constructed from 3 years of measurements on a pool and riffle stream. Total sediment load increased five times along a 26-mile length of stream; most sediment came from 204 eroding banks. Three-fourths of the total sediment load was sand size. The area of streambe 'overed with nd decreased downstream, indicating that the transporting capacity of the stream exceeded sediment supply. Complete streambank stabilization would reduce the sediment load by about half and probably result in streambed composition changes beneficial to trout. (Knapp-USGS)
W71-11351

RELEASE OF METHYL MERCURY FROM SEDIMENTS WITH LAYERS CONTAINING INORGANIC MERCURY AT DIFFERENT DEPTHS,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 05B.
W71-11358

COASTAL EROSION IN NORTH CAROLINA,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11477

METHODS OF COPING WITH COASTAL EROSION,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11478

USE OF VEGETATION FOR DUNE STABILIZATION,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11479

QUANTITATIVE SPECTRAL ANALYSIS OF SOME MICROELEMENTS IN MARINE SEDIMENTS,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 05A.
W71-11554

2K. Chemical Processes

ISOTOPIC COMPOSITION OF CARBONATES IN A MARGINAL MARINE FORMATION,
Minnesota Geological Survey, Minneapolis; and Leicester Univ. (England). Dept. of Geology.
F. C. Tan, and J. D. Hudson.
Nature Physical Science, Vol 232, No 30, p 87-88, July 26, 1971. 2 p, 1 fig, 1 tab, 15 ref.

Descriptors: *Sedimentology, *Estuaries, *Radioactive dating, *Shellfish, *Geologic time, Radioisotopes, Dating, Carbon radioisotopes, Estuarine environment.
Identifiers: *Radioactive dating (Estuarine fossils), *Estuarine fossils.

In marginal marine environments, fossils can have very different compositions from their matrix. Diagenesis has obliterated the record of depositional environment from the matrix, and whole rock samples should therefore not be used in paleoecological isotope studies. Well preserved fossils, however, retain their isotopic composition. Mollusks usually deposit their calcium carbonate shells in isotopic equilibrium with the dissolved bicarbonate of the water in which they live; and the oxygen is in equilibrium with the water itself. Temperature also has an effect on the isotopic composition of the shell, but in most regions where freshwater-marine transitions have been studied this is outweighed by the large isotopic difference between marine and freshwater. Thus fossil shells can be used to monitor changes in bicarbonate isotopic composition. Many limestones are composed of the shells of invertebrates, and there is a clear distinction between the average carbon isotopic compositions of marine and freshwater limestones back into the Palaeozoic. (Woodard-USGS)
W71-11082

EXPERIMENTAL INVESTIGATION OF THE RATE AND MECHANISM OF OXIDATION OF HYDROGEN SULFIDE IN THE BLACK SEA USING S-35,
Yu. I. Sorokin.
Oceanology, Vol 10, No 1, p 37-46, 1970. 10 p, 4 fig, 1 tab, 22 ref.

Descriptors: *Oxidation, *Hydrogen sulfide, *Sea water, *Water chemistry, Sulfates, Sulfides, Oxidation-reduction potential, Hydrogen ion concentration, Sulfur bacteria, Mixing, Dissolved oxygen, Biodegradation, Stratification, Oxygen demand.
Identifiers: *Black Sea.

The oxidation of hydrogen sulfide in the waters of the Black Sea was studied using tagged sulfide (tagged with S-35). Preliminary data on the rate and mechanism of this process were obtained. Oxidation of hydrogen sulfide occurs in the mixing zone of oxygen-containing water and hydrogen sulfide water at Eh from -10 to -60 mV. The process of oxidation involves two stages: chemical oxidation of the hydrogen sulfide to sulfate and thiosulfate, which form in proportions of approximately 1:1, but with some slight excess of thiosulfate; and bacterial oxidation of the thiosulfate. The rate of oxidation of H2S in the mixing zone reaches 100 gamma per liter-day. The maximum efficiency of oxidation energy utilization for biosynthesis of bacteria is 18%. The data obtained throw light on the total cycle of sulfur in the Black Sea.
W71-11093

GEOCHEMISTRY OF SOME PETROLEUM-ASSOCIATED WATERS FROM LOUISIANA,
Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center.
A. Gene Collins.
Bureau of Mines Report of Investigations RI 7326, January 1970. 31 p, 9 fig, 12 tab, 51 ref.

Descriptors: *Geochemistry, *Groundwater, *Oil industry, *Louisiana, Sedimentary rocks, Chemical analysis, Brines, Geology, Water analysis, Sampling, Water properties.
Identifiers: *Petroleum-associated waters.

Geochemical relationships that exist between subsurface fluids and the associated geologic strata in petroleum producing areas of Louisiana were determined. Samples of petroleum-associated water were obtained from 126 wells of three geologic ages: Tertiary, Cretaceous, and Jurassic. The samples were analyzed for chemical composition to determine if the compositions varied with the geologic strata of their source. The dissolved constituents were compared with those of a brine that was concentrated by evaporation. The concentrations of bromide, calcium, and strontium were useful in distinguishing the brines produced from sediments of a late age from those of an earlier age. The concentration ratios of Mg' (total equivalent magnesium) and bromide indicated that dolomitization probably had occurred and altered the composition of the brines. A principal-components analysis of the data indicated an inverse relationship between depth and concentrations of bromide, strontium, calcium, and lithium.
W71-11110

HYDROGEOCHEMICAL BALANCE OF USSR LANDS (O gidrogeokhimicheskom balanse territorii SSSR),
Akademiya Nauk SSSR. Institut Geologii.
For primary bibliographic entry see Field 02F.
W71-11116

HYDROGEOCHEMICAL AND HYDRODYNAMIC PATTERNS IN KARST FORMATION (Gidrogeokhimicheskiye i gidrodinamicheskiye zakonomernosti razvitiya karsta),
Akademiya Nauk SSSR. Institut Geologii.
For primary bibliographic entry see Field 02J.
W71-11118

ORIGIN OF SODIUM-SULFATE SALINIZATION IN THE CASPIAN REGION AS A RESULT OF THE METAMORPHISM OF SEA SALTS (O proiskhozhdenii sul'fatno-natriyevogo zasoleniya v Prikaspii vsledstviye metamorfizatsii soley morskogo genezisa),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
Yu. A. Slavnyy.
Akademiya Nauk SSSR Doklady, Vol 194, No 2, p 939-942, 1970. 4 p, 1 tab, 6 ref.

Descriptors: *Salinity, *Soil chemistry, *Water quality, *Saline water, *Salts, Fresh water, Groundwater, Sodium sulfate, Magnesium compounds, Calcium sulfate, Adsorption.
Identifiers: *USSR, *Caspian Sea, Solonetzes, Solonchaks, Infiltration water, Magnesium sulfate, Mineralization.

The chemical composition of soil solutions of a Meadowlike-Steppe Solonchak Solonetz of the Khvalynian accumulation plain of the Caspian lowland is of the sodium-sulfate type. The upper layers of the Solonetz soil water and of the groundwater are of the sodium-bicarbonate type, which is usually an indication of the complete removal of readily soluble salts from the soil. Two points of view exist regarding the possible formation of sodium-sulfate groundwaters in the Caspian region. One attributes the formation to exchange adsorption between the saline clays containing adsorbed sodium and the infiltration waters containing calcium sulfate. The other mode of formation is through the interaction of sodium-bicarbonate (infiltration) waters with waters and rocks of marine origin containing calcium and magnesium sulfates. In the opinion of the author, this process is responsible for the earlier appearance of sodium sulfate and for its present-day formation in Solonetzes on the poorly drained Khvalynian plain. (Josefson-USGS)
W71-11120

SEASONAL DYNAMICS OF THE COMPOSITION OF LYSIMETRIC AND BROOK WATERS IN PODZOLIC SOILS OF CONIFEROUS FORESTS (Sezonnaya dinamika sostava lizimetricheskikh i ruch'yevykh vod v podzolistykh pochvakh pod khvoynymi lesami),
Leningrad State Univ. (USSR). Chair of Biogeography; and Leningrad State Univ. (USSR). Dept. of Geography.
For primary bibliographic entry see Field 02G.
W71-11123

DISTRIBUTION OF SODIUM CARBONATE SALINIZATION IN THE GROUNDWATER AND SOILS OF THE LOWER DON FLOODPLAIN AND DELTA (Rasprostraneniye sodovogo zasoleniya v gruntovykh vodakh i pochvakh poymy i del'ty nizhnego techeniya r. Don),
For primary bibliographic entry see Field 02G.
W71-11124

APPLICABILITY OF MATHEMATICAL MODELS OF GROUNDWATER FLOW SYSTEMS TO HYDROGEOCHEMICAL EXPLORATION,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 02F.
W71-11131

GEOLOGY AND GEOCHEMICAL EXPLORATION OF THE VIENNA DISTRICT, BLAINE AND CAMAS COUNTIES, IDAHO,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 02J.
W71-11133

HYDROLOGY, ACTIVITY, AND HEAT FLOW OF THE STEAMBOAT SPRINGS THERMAL SYSTEM, WASHOE COUNTY, NEVADA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W71-11141

GROUND-WATER QUALITY AND STRUCTURAL CONTROL IN SOUTHEASTERN VIRGINIA,
Marshall Univ., Huntington, W. Va. Dept. of Geology; and Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 02F.
W71-11205

STANDARDIZED WATER ANALYSES AND THEIR APPLICATION TO RIVER SURVEYS IN NATAL,
National Inst. for Water Research, Durban (South Africa). Natal Regional Lab.
For primary bibliographic entry see Field 05A.
W71-11211

CHEMISTRY OF NATURAL WATERS--1. FUNDAMENTAL RELATIONSHIPS,
National Inst. for Water Research, Durban (South Africa). Natal Regional Lab.
P. H. Kemp.
Water Research, Vol 5, No 6, p 297-311, June 1971. 15 p, 2 tab, 23 ref.

Descriptors: *Water chemistry, *Ions, *Hydrolosis, *Aqueous solutions, Equilibrium, Hydrogen ion concentration, Solutes, Chemical reactions, Chemical potential, Carbonates, Calcium, Chlorides, Magnesium, Sulfates, Sodium.

The ideal fundamental equations governing the interionic equilibria existing in natural waters are presented, using the systematic approach devised by Ricci. The advantage of this particular approach is that it leads automatically to simple approximations of very high accuracy which are applicable under conditions that can be precisely specified. It is in general unnecessary to adduce additional and dubious simplifying assumptions that might vitiate the final results. The equations are readily corrected for non-ideality by considering the total dissolved solids content of the water. They lead to relatively simple expressions for the hydrogen ion concentration and hence the pH value of such waters. (Knapp-USGS)
W71-11212

CHARACTERISTICS OF LIMESTONE SOLUTION IN THE SOUTHERN ROCKY MOUNTAINS AND SELKIRK MOUNTAINS, ALBERTA AND BRITISH COLUMBIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 02J.
W71-11214

TECHNIQUES FOR QUALITY-OF-WATER INTERPRETATIONS FROM CALIBRATED GEOPHYSICAL LOGS, ATLANTIC COASTAL AREA,
Geological Survey, Norfolk, Va. Water Resources Div.
For primary bibliographic entry see Field 02F.
W71-11218

PARTICLE SIZE EFFECT ON THE REACTION GOETHITE — HEMATITE .. WATER,
Pennsylvania State Univ., University Park. Dept. of Geochemistry and Mineralogy.
For primary bibliographic entry see Field 02J.
W71-11224

ORGANIC MATTER IN NATURAL WATERS--A SYMPOSIUM.
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W71-11226

DISTRIBUTION AND CYCLING OF ORGANIC MATTER IN THE OCEANS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05B.
W71-11227

LIPIDS OF MARINE WATERS,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 05A.
W71-11228

CARBONATE-ORGANIC INTERACTIONS IN SEA WATER,
Hawaii Univ., Honolulu. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W71-11240

ORGANIC CHELATION OF Co-60 AND Zn-65 BY LEUCINE IN RELATION TO SORPTION BY SEDIMENTS,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.
E. K. Duursma.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 387-397, June 1970. 11 p, 3 fig, 1 tab, 7 ref.

Descriptors: *Chelation, *Organic matter, *Sea water, *Water chemistry, *Trace elements, Sorption, Chemical reactions, Calcium, Magnesium, Cobalt.
Identifiers: Leucine.

The sorption of Co-60 and Zn-65, as determined for one fresh water and two marine sediments, is reduced by the addition of 0.001 to 0.01 M leucine. This reduction is almost equal to that calculated from their stability constants with leucine, if the chelation of Ca, Mg and H by leucine is also taken into account. Extrapolation of the results to sea conditions shows that no chelation of Co and Zn is possible at microgram liter concentrations of leucine. These elements could be chelated if stronger chelating agents occur in the sea at concentrations of some tenths of a mg C/liter. This is illustrated with two examples using quinoline-2-carboxylic acid and EDTA, from which it can be concluded that specific competition between different metal complexes is very important. (See also W71-11226) (Knapp-USGS)
W71-11241

THE ENHANCED PRESERVATION OF ORGANIC MATTER IN ANOXIC MARINE ENVIRONMENTS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W71-11242

INFLUENCE OF ORGANIC MATTER ON INORGANIC PRECIPITATION,
Nagoya Univ. (Japan). Water Research Lab.
Y. Kitano, N. Kanamori, and A. Tokuyama.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 413-447, June 1970. 35 p, 11 fig, 7 tab, 40 ref.

Descriptors: *Sea water, *Chemical precipitation, *Calcium carbonate, *Water chemistry, *Organic matter, Chelation, Equilibrium, Carbonates, Calcium, Magnesium, Sedimentation, Paleohydrology, Paleoclimatology.

Carbonates were precipitated in the laboratory from solutions chemically similar to those in which marine carbonate skeletons are formed. In the parent solution, calcium bicarbonate was varied by adding the chlorides of minor elements, sodium chloride, magnesium chloride and organic compounds in various proportions. Mg-poor calcite, aragonite and Mg-rich calcite were precipitated. The crystal form and minor element constituents of carbonates prepared in the laboratory were determined and compared with those of marine skeletal materials. (See also W71-11226) (Knapp-USGS)
W71-11243

ORGANIC CHEMISTRY OF NATURAL SEA SURFACE FILMS,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11245

CONDITIONAL STABILITY CONSTANTS OF A NORTH CAROLINA SOIL FULVIC ACID WITH Co (2..) AND Fe (3..),
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02G.
W71-11246

TRANSITION METAL BINDING BY LARGE MOLECULES IN HIGH LATITUDE WATERS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W71-11247

DETERMINATION OF RADIUM-228 IN NATURAL WATERS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05A.
W71-11252

WATER RESOURCES DATA FOR KANSAS, PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 07C.
W71-11265

CHEMISTRY OF WATER AND SEDIMENTS IN BARATARIA BAY,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02L.
W71-11273

WATER COMPOSITION CONTROLS BY CLAY MINERALS,
Washington State Water Research Center, Pullman.
For primary bibliographic entry see Field 02G.
W71-11300

CORRELATION TIMES AND REORIENTATION ACTIVATION ENERGIES FOR TETRAALKYLAMMONIUM IONS IN AQUEOUS SOLUTIONS,
Missouri Univ., St. Louis. Dept. of Chemistry.
For primary bibliographic entry see Field 01B.
W71-11319

SIMULATION OF WATER QUALITY IN STREAMS AND CANALS,
Masch (Fred D.) and Associates, Austin, Tex; and Texas Water Development Board, Austin.
For primary bibliographic entry see Field 05B.
W71-11352

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE RED RIVER BASIN, TEXAS.
Geological Survey, Austin, Tex.
Donald K. Leifeste, James F. Blakey, and Leon S. Hughes.
Texas Water Development Board Report 129, Austin, May 1971. 68 p, 14 fig, 7 tab, 34 ref.

Descriptors: *Water quality, *River basins, *Texas, *Streamflow, *Chemical analysis, Water chemistry, Hydrologic data, Data collections, Reviews, Geology, Surface waters, Water pollution sources.
Identifiers: *Red River basin (Tex).

The dissolved-mineral content and chemical character of waters in the Red River basin in Texas vary widely from place to place and from time to time. Geologic factors, runoff and streamflow characteristics, and activities of man largely determine the nature and amount of dissolved material transported by the Red River and its tributaries. In the semiarid western part of the basin, base flow is usually nonexistent. However, numerous seeps and springs in Permian rocks that crop out in this part of the basin account for much of the salt load in the Red River above Lake Texoma. The water quality of the main stem has been further degraded by oilfield brines. The eastern part of the basin is in an area of high rainfall and well-leached rocks and soils. Groundwater effluent is generally low in dissolved minerals, and the dissolved-solids content of streamflow varies only slightly with discharge. The concentrations of dissolved solids in streams in the Red River basin range from several thousand to less than 250 mg/l. (Woodard-USGS)
W71-11353

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE COASTAL BASINS OF TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02L.
W71-11354

GAS CHROMATOGRAPHY: TECHNIQUES AND USES IN SOIL, PLANT, AND WATER ANALYSIS,
Wisconsin Univ., Madison. Dept. of Soil Science.
G. Chesters, J. R. Konrad, B. D. Schrag, and L. Everett.
Reprint from Instrumental Methods for Analysis of Soils and Plant Tissue, 1971, p 129-183. 5 5p, 397 ref. OWRR Project B-016-WIS (12).

Descriptors: *Chromatography, *Analytical techniques, *Water analysis, *Gas chromatography, Soils, Plants, *Reviews, *Bibliographies, *Soil analysis.
Identifiers: Instrument costs, *Insecticide determination, Continuous elemental analysis, Plant compounds determination.

A review of 397 sources indicated the multiplicity and variety of gas chromatographic methods of analyses that have already been described on a wide variety of substrates. The technique is applicable to many types of biochemicals, organic chemicals, and inorganic chemicals, but in some respects is a tool that has been neglected in soil science investigations except for the area of pesticide analysis. Gas chromatographic analyses are often rapid, accurate, and extremely sensitive but have the disadvantage in soils and other biological systems of sometimes requiring extensive sample cleanup prior to use. In combinations with other instrumental techniques of analysis it is safe to predict that a great diversity of improved methods will be described in the next decade. The scope of this review was so vast that only suggestions have been made as to examples of usages to which the gas chromatograph might be put.
W71-11410

ENVIRONMENTAL ASPECTS OF MERCURY USAGE.
Dow Chemical Corp., Midland, Mich.
For primary bibliographic entry see Field 05C.
W71-11417

POTENTIOMETRIC MICRODETERMINATION OF PHOSPHATE WITH AN ION-SELECTIVE LEAD ELECTRODE,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 05A.
W71-11530

THE USE OF COLLABORATIVE STUDIES TO EVALUATE WATER ANALYSIS INSTRUMENTS,
Environmental Control Administration, Cincinnati, Ohio.
For primary bibliographic entry see Field 05A.
W71-11532

THE DETERMINATION OF SULPHATE IN SEA WATER BY MEANS OF PHOTOMETRIC TITRATION WITH HYDROCHLORIC ACID IN DIMETHYL SULPHOXIDE,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
Daniel Jagner.
Analytica Chimica Acta, Vol 52, No 3, p 483-490, December 1970. 1 fig, 2 tab, 17 ref.

Descriptors: *Volumetric analysis, *Sulphates, *Seawater, Alkalinity, Photometry, Electrodes, Salinity, Automation.
Identifiers: Photometric titration.

A titration method is described in which sulphate is titrated in dimethyl sulphoxide solution with hydrochloric acid to hydrogen sulphate, using bromocresol green as indicator. The end-point is determined graphically from the photometric titration data. The results obtained are in good agreement with others obtained gravimetrically, and the accuracy and precision are comparable. The time required is much less; a single titration can be performed in 15 minutes. If a semi-automatic titrator is used, several titrations can be run simultaneously and determinations thus made more rapidly. Since borate, carbonate, and hydrogen carborate interfere, a separate determination of the alkalinity is necessary. The method can be used satisfactorily for seawater samples with a chlorinity of at least 2 percent. (Mortland-Battelle)
W71-11536

A RAPID SEMI-AUTOMATIC METHOD FOR THE DETERMINATION OF THE TOTAL HALIDE CONCENTRATION IN SEA WATER BY MEANS OF POTENTIOMETRIC TITRATION,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
Daniel Jagner, and Kerstin Aren.
Analytica Chimica Acta, Vol 52, No 3, p 491-502, December 1970. 2 fig, 4 tab, 14 ref.

Descriptors: *Volumetric analysis, *Halides, *Seawater, *Data processing, Electrodes, Chlorides, Computer programs, Mathematical studies, Automation.
Identifiers: Potentiometric titration, Gran method.

A semi-automatic potentiometric titration of the total halide concentration in sea water with silver nitrate is described. The titration is followed with a silver electrode and the titration data, which are recorded directly on punched tape and typewriter, are evaluated by means of a computer program based on the Gran extrapolation method. The determinations have a precision of plus or minus .02 percent and, since many samples can be titrated simultaneously, the time for a single determination including evaluation and editing of titration data can be reduced to less than 5 minutes. (Mortland-Battelle)
W71-11537

SIMULTANEOUS DETERMINATION OF SILICATE AND PHOSPHATE BY AN AUTOMATED DIFFERENTIAL KINETIC PROCEDURE,
Michigan State Univ., East Lansing. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W71-11565

POLAROGRAPHIC DETERMINATION OF TRACES OF NITRILOTRIACETATE IN WATER SAMPLES,
Proctor and Gamble Co., Cincinnati, Ohio. Miami Valley Labs.
For primary bibliographic entry see Field 05A.
W71-11566

CRITERIA FOR JUDGING ACCEPTABILITY OF ANALYTICAL METHODS,
Food and Drug Administration, Los Angeles, Calif.
For primary bibliographic entry see Field 05A.
W71-11569

INTERLABORATORY COMPARISON OF ANALYSIS OF TRITIUM IN NATURAL WATERS,
International Atomic Energy Agency, Vienna (Austria).
For primary bibliographic entry see Field 05A.
W71-11574

CONTRIBUTION TO THE MASS-SPECTROMETRIC IDENTIFICATION WITH COMPUTERS (Beitrag zur Massenspektrometerischen Identifizerung mit Computern),
Karlsruhe Univ. (West Germany). Institut fuer Gastechnik, Feuerungstechnik und Wasserchemie.
A. Herlan.
Zeitschrift fur Analytische Chemie, Vol 253, No 1, p 1-6, 1971. 2 fig, 1 tab, 11 ref.

Descriptors: *Organic compounds, *Spectrometers, *Computer programs, Automation.
Identifiers: *Paraffins.

A computer method is proposed for the identification of organic compounds by comparing spectra. The method is demonstrated with the example of the distinction between the possible paraffins from C sub 6 to C sub 9. On comparison with reference spectra intensity relationships are used, which in most cases are not referring to the base peak. For these relationships deviations of at least a factor of 2 are tolerated. (Mortland-Battelle)
W71-11575

DETERMINATION OF BICARBONATE IN WATER IN PRESENCE OF ANIONS OF OTHER WEAK ACIDS (Hydrogenear bonat-Bestimmung um Wasser in Anwesenheit von Anionen anderor Schwacher Sauron),
Munich Univ. (West Germany). Institut fuer Wasserchemie und Chemische Balneologie.
A. Rosopulo, and K. E. Quentin.
Zeitschrift fur Analytische Chemie, Vol 253, No 1, p 27-29, 1971. 1 fig, 6 ref.

Descriptors: *Bicarbonates, *Volumetric analysis, *Gravimetric analysis, Organic matter, Carbon dioxide, Analytical techniques, Acids.
Identifiers: Chemical interference.

The contemporary presence of anions of other weak acids is able to simulate a much elevated content by the volumetric determination of bicarbonate, especially in waters with a considerable

loading of organic matters. A process was elaborated, which finds out the real content of bicarbonate with an error of -5 percent at most, consisting in the gravimetric determination of total carbon dioxide and the volumetric determination of free carbon dioxide. HCO sub 3 ion is calculated from the difference. (McCann-Battelle)
W71-11576

DETERMINATION OF TRACE ELEMENTS IN SERUM AND URINE WITH FLAMELESS ATOMIZATION (Bestimmung von Spurenelementen in Serum und Urin mit flammenloser Atomisierung),
Perkin-Elmer and Co., G.m.b.H., Bodenseewerke, Ueberlingen (West Germany).
For primary bibliographic entry see Field 05A.
W71-11577

SPECIFIC-ION ELECTRODE DETERMINATION OF NITRATE IN SOME FRESHWATERS AND SEWAGE EFFLUENTS,
Pennsylvania State Univ., University Park. Dept. of Geochemistry and Mineralogy.
For primary bibliographic entry see Field 05A.
W71-11578

2L. Estuaries

ISOTOPIC COMPOSITION OF CARBONATES IN A MARGINAL MARINE FORMATION,
Minnesota Geological Survey, Minneapolis; and Leicester Univ. (England). Dept. of Geology.
For primary bibliographic entry see Field 02K.
W71-11082

CURRENTS AND WATER EXCHANGE IN DNESTROVSKIY LIMAN,
M. Sh. Rozengurt.
Transl. from Inst. Biologii Yuzhnykh Morey, Vol 20, No 2, p 50-59, Kiev, 1967. Available from Nat. Tech. Inf. Service as AD-717 321. Naval Oceanographic Office Translation 502, 1970. 11 p, 3 fig, 3 tab, 13 ref.

Descriptors: *Water circulation, *Estuaries, *Currents (Water), *Salinity, Water supply, Water balance, Hydrology, Winds, Ion exchange, Water chemistry, Irrigation, Water quality, Mathematical studies.
Identifiers: *USSR, *Dnestrovskii Liman (USSR), Black Sea.

The existing current pattern in Dnestrovskiy liman, USSR, oriented in NW-SE direction, is discussed. The currents, induced by variations in precipitation and winds, vary with seasons and years. The salinity variations are accounted for by using actual measurements and calculations. As the water is increasingly used for irrigation, the existing current pattern and salinity values are changing. This effect will increase when the plan of excavating a canal connecting the Danube with the Dnestrovskiy liman is materialized. Calculations based on measurements demonstrate the possible changes in water balance, currents and salinity.
W71-11111

FOOD SCIENCE AND MARICULTURE,
Louisiana State Univ., Baton Rouge. Dept. of Food Science and Technology.
Samuel P. Meyers, and Arthur F. Novak.
Coastal Studies Bulletin No. 5, Special Sea Grant Issue, February, 1970, p 135-139, 5 ref. NSF Grant GH-47

Descriptors: *Foods, *Fish, *Shellfish, Research and development, Fish farming, Economics, Productivity, Resources, Quality control, Microbiology, Bacteria.
Identifiers: *Mariculture.

In cooperation with the Louisiana seafood industry, programs of seafood plant sanitation, regulatory problems, and maintenance of acceptable bacteriological standards for seafood and seafood products have been established. Specific research topics include: development of new methodology for rapid identification of index microorganisms in shrimp; utilization of net haul 'trash' or commercial fish for use as animal protein; nutritive value of marsh grass; vitamin retention in seafood products prepared by microwave cookery; and analyses of seafood flavor components. Mariculture practices have a direct bearing on the development of better mechanisms for preservation and quality control of the seafood product. Most mariculture crops are considered luxury foods today, but this will change when economically efficient methods of mass production are developed, within food standard regulations. Knowledge of the ecology of mariculture systems must be extended, the impact of environmental contamination, and the establishment of microbiological standards must be studied. Fish and shellfish crops need special consideration in regard to flavor, taste, appearance and maintenance of product quality. Problems of maintenance, nutrition and disease must be solved for economic development of fish and shellfish farming, by the application of sound food science technology. (Smith-PAI)
W71-11271

LOUISIANA AND THE SEA GRANT PROGRAM,
Louisiana State Univ., Baton Rouge. Office of Sea Grant Development.
Jack R. Van Lopik.
Coastal Studies Bulletin No. 5, Special Sea Grant Issue, February, 1970, p v-xvii. 1 fig, 11 tab. NSF Grant GH-47

Descriptors: *Natural resources, *Water resources development, *Coastal plains, Wetlands, Coastal marshes, Exploitation, Commercial fishing, Industrial production, Research and development, Universities, Environmental effects, Louisiana.

The National Sea Grant Program of 1966, implemented by the National Science Foundation, is directed to practical uses of the marine environment and is very applicable to Louisiana. 45 percent of Louisiana consists of coastal and floodplain wetlands which contain a large proportion of its population and manufacturing capability. Waterborne commerce is vital to the economy of the State and is increasing in volume. Louisiana has grown on the production of oil and the use of water, but requires development of its marine and coastal resources. Many acres are important habitats for fish and wildlife, including commercially valuable species such as shrimp, oysters and crab. Recreational, hunting and educational activities should be increased in such a way as to preserve the natural resources. Coastal and wetland research has been conducted mainly by the Louisiana Wild Life and Fisheries Commission and Louisiana State University, but further scientific, social economic and legal studies must be undertaken in association. Sea Grant activities are focused on development of knowledge and technology for effective management and utilization of the coastal wetlands, entailing studies of its geology, flora and fauna, and the controlled exploitation of the mineral and biological resources. Various educational institutions and grants are being directed to fulfill these aims. (Smith-PAI)
W71-11272

CHEMISTRY OF WATER AND SEDIMENTS IN BARATARIA BAY,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
Clara L. Ho, Elke H. Schweinsberg, and Linda Reeves.
Coastal Studies Bulletin No. 5, Special Sea Grant Issue, February, 1970, p 41-56. 11 fig, 13 ref. NSF Grant GH-47.

Descriptors: *Environmental effects, *Chemical analysis, *Shrimp, *Estuaries, Bays, Sampling, Data collection, Aquatic environment, Nutrients, Organic matter, Lakes, Louisiana.
Identifiers: *Barataria Bay (La.).

The chemical environment in Barataria Bay is characterized in three areas: John the Fool Lake, Airplane Lake and Lake Palourde. John the Fool Lake is connected to the freshwater Round Lake by a long channel and has a low shrimp population. Airplane Lake is connected to Bay Macoin by a long channel and has a high shrimp population. Lake Palourde is connected to Bay Macoin by a short channel and has a medium shrimp population. Ten sampling stations were established in these areas, and soft surface sediment and water samples were collected for analysis. Organic analyses gave best results when the samples were dried while frozen. Sediments in John the Fool Lake contained high organics, sulfides and total-P but were lower in pH and soluble salt content than the other two areas. Nutrient content and available phosphate in water were also highest in John the Fool Lake in early spring and late fall but decreased in June in all three lakes. Airplane Lake had higher organics and sulfides in sediment but low total-P in the water compared with Lake Palourde. Total soluble salts fluctuated according to the rainfall. Data indicate that there is high production of organics and nutrients but that they do not necessarily provide the optimal environment for shrimp production. (Smith-PAI)
W71-11273

LIPID CONTENT OF SEDIMENTS AND WATERS IN SELECTED SITES IN BARATARIA BAY,
Louisiana State Univ., Baton Rouge. Dept. of Biochemistry.
R. S. Allen, and Mary Able.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 57-64. 4 fig, 3 tab, 2 ref. NSF Grant GH-47.

Descriptors: *Water analysis, *Sedimentation, *Lipids, Bays, Estuaries, Chemical analysis, Shrimp, Data collection, Sampling, Ecology, Lakes, Louisiana.
Identifiers: *Barataria Bay (La).

A preliminary study of the lipid content of sediments and water samples collected from sites in Barataria Bay will be applied to an overall study of the ecological aspects of the area for shrimp production. Twelve sample sites were selected on John the Fool Lake, Airplane Lake and Lake Palourde. Monthly sediment samples were taken near the shore and offshore. Samples were stored frozen and dried. Water samples were pumped from a region about six inches from the surface of the sediment. The total lipids in the filtered waters were extracted with redistilled petroleum ether, and the data are reported as mg./liter. Results show regional differences and seasonal changes, as shown in the tables. Lipid levels of sediments from John the Fool Lake were the highest. Mean values over an 8-month period showed lipid content higher in lakes than in bays and channels. Nearshore lake samples also showed higher values than off-shore samples. Shrimp production was best in Airplane Lake, reflecting greater microbial activity in the water. The nature of lipids extracted from sediments has not been clearly determined and it is not yet possible to assess the relationship of lipids to shrimp production. More intensive investigation of Airplane Lake is planned. (Smith-PAI)
W71-11274

SHRIMP SAMPLING TECHNIQUES AND PRELIMINARY RESULTS IN TWO SMALL AREAS IN BARATARIA BAY, LOUISIANA,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
Harold Loesch, and Joe Jacob.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 65-81. 6 fig, 6 tab, 4 ref. NSF Grant GH-47.

Descriptors: *Shrimp, *Sampling, *Ecology, Bays, Lakes, Estuaries, Data collection, Productivity, Distribution patterns, Growth rates, Louisiana.
Identifiers: *Barataria Bay (La).

Two areas of Barataria Bay, the northern one containing large numbers of juvenile shrimp and the southern containing small numbers, were studied for gaining understanding of how shrimp fit into the total ecological picture. Twelve sampling stations were established and a shrimp trawl was used for part of the time but it was not possible to work very near shore. It is planned to relocate the stations in 1970 and new shrimp-sampling gear is being developed. Shrimp catching data showed that Airplane Lake and Lake Palourde peaked at about 100 shrimp per minute in early May then declined, and John the Fool Lake produced appreciable numbers of brown shrimp only in May and June. The 30 percent difference in average survival per half-month period in Airplane Lake and Lake Palourde may be attributed to fishing, and the other 25 percent to predation and migration. A minimal growth of 65mm in 2-1/2 months was estimated for brown shrimp in Lake Palourde. After August brown shrimp became scarce, but white shrimp appeared in the catch in early June. A maximal growth estimate for white shrimp in one month is suggested, and a pattern of the movement of larger shrimp from the inside area and younger shrimp becoming established was indicated. More intensive sampling is planned in order to establish possible relationships between the movement of shrimps and various phenomena, leading to improved shrimp productivity. (Smith-PAI)
W71-11275

MARICULTURE IN THE UNITED STATES-AN OVERVIEW,
Louisiana State Univ., Baton Rouge. Div. of Fisheries.
James W. Avault, Jr., and Kenneth O. Allen.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 141-145. 1 plate, 2 ref. NSF Grant GH-47.

Descriptors: *Foods, *Fish farming, Fish, Shellfish, Shrimp, Oysters, Ponds, Cultivation, Economics, Fisheries.
Identifiers: *Mariculture.

Mariculture makes use of brackish or saline waters to culture seafoods such as shrimp and oysters. The market for fishery products is increasing but commercial fishery in the United States has declined because of the high cost of offshore vessels and high labor and maintenance costs. Pond culture of fish, especially catfish, has grown tremendously and the culture of new species, such as shrimp, pompano and other seafoods, is being considered. Fish farming has an impact on business communities because it generates further demand, for example: fish feed; materials which go into fish feed; development and provision of chemicals; pond construction; wells; pumps; truck hauling; and labor for harvesting fish. Many landholding companies are now becoming interested in fish farming and the diversifying of their enterprises by mariculture. Catfish farming has proved to be profitable but mariculture of shrimp and pompano requires much more research into the biology and basis requirements of the species. Oxygen requirement, temperature tolerances, parasites, diseases and spawning patterns all require detailed study. Legal structures for the leasing of waters for mariculture purposes must also be defined. (Smith-PAI)
W71-11276

MYCOLOGICAL STUDIES IN BARATARIA BAY, LOUISIANA, AND BIODEGRADATION OF OYSTER GRASS, SPARTINA ALTERNIFLORA.
Louisiana State Univ., Baton Rouge. Dept. of Food Science and Technology.
S. P. Meyers, M. L. Nicholson, J. Rhee, and P. Miles.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 111-124. 5 fig, 3 tab, 10 ref. NSF Grant GH-47

Descriptors: *Marsh plants, *Aquatic microbiology, Fungi, Yeasts, Grasses, Laboratory tests, Biodegradation, Estuarine environment, Ecosystems, Louisiana.
Identifiers: *Spartina alterniflora, *Barataria Bay (La).

Spartina alterniflora is an important source of substrates and nutrients for microbial transformation processes in the brackish marshland ecosystem. Little is known of the mycological aspects of oyster grass degradation. The biodegradative processes in the Spartina ecosystem, with particular emphasis on the ecological role of yeasts and filamentous fungi, is investigated. Particular attention has been given to higher sections of the marshland supporting dense Spartina growth, the rhizosphere environment. Yeasts were collected monthly from various stations in Barataria Bay during 1969, water samples were taken at offshore stations and along the edge of the grass, and offshore sediment samples were obtained. Laboratory tests on the samples are described. The densities of yeast populations are tabulated, and in general estuarine waters contain a greater number of yeasts per volume, and more yeast species, than the open sea. The majority of yeasts were able to utilize methylamine and ethylamine as sole sources of nitrogen for growth. Extracellular proteolytic activity by yeasts, filamentous fungal infestation of Spartina, and nematode activity were all investigated. The role of yeasts in Spartina biodegradation involves mainly utilization of products resulting from a primary attack on the plant matter by other organisms. Certain species of yeast and yeastlike fungi may be used as indicators of atypical environmental conditions. (Smith-PAI)
W71-11277

LOUISIANA STATE UNIVERSITY LAW CENTER RESEARCH ACTIVITIES,
Louisiana State Univ., Baton Rouge. Law School.
H. Gary Knight.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 173-177. NSF Grant GH-47

Descriptors: *Legal aspects, *Coasts, *Water resources, Resource development, *Water law, Regulation, Management, Analysis, Education, Universities, Louisiana.

The LSU Law Center compiled and analyzed Louisiana laws, regulations, and judicial and administrative decisions which affect the state's marine and coastal resources. A compilation and analysis of state laws entailed examination of the state constitution, codes, statutes, administrative regulations, judicial decisions and other relative sources of material. Publication of this data will be followed by research on the analysis phase of the project and recommendations for legislative and other action for the rational management of marine and coastal resources for maximum public benefit. Curriculum expansion was achieved by the creation and adoption of a course offering in Marine Resources Law for graduate science students and junior and senior law students. It is hoped that proposals to the state government will lead to the creation of a commission to act as a coordinating mechanism for state marine resource policy and to initiate coastal zone management studies. A casebook on coastal zone management and the administration of outer continental shelf lands of the United States has been published, together with supplementary information. The Law Center plans to continue expanding the range of its activities, information and assistance. (Smith-PAI)
W71-11278

A SUMMARY OF THE FOCUS AND OBJECTIVES OF THE BARATARIA BAY RESEARCH PROGRAM,
Louisiana State Univ., Baton Rouge. Dept. of Botany.
James G. Gosselink.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 1-8. 1 fig, 2 tab. NSF Grant GH-47.

Descriptors: *Water resources development, *Natural resources, *Bays, Inlets, Data collections, Data processing, Ecology, Ecosystems, Fisheries, Sampling, Estuaries, Louisiana.
Identifiers: *Barataria Bay (La).

The salt marsh-lake-stream-bay complex of Barataria Bay, Louisiana, is somewhat triangular, slanted toward the southeast, with barrier islands and marsh barrier beaches forming the base. Vegetation characterizing the marshes is described. The water system is shallow, tides are small, except for wind tides, and the bay produces shrimp, oysters, crab and sport fish. The research program began in 1969 with the initial objective of developing important fish and shellfish species. After a year's operations, aims were changed to include the understanding of the total ecosystem of the bay and the ecology of estuarine areas. Twelve sampling stations were set up in three primary sites: a large saline lake, a small lake with a single narrow entrance, and a brackish wiregrass marsh. Sampling methods, instrument stations and a data banking system were organized and principal results were summarized. Phytoplankton studies were also undertaken, colony counts were made and species identified, though not yet completely. Research plans for 1970 emphasize the synthesis of all data being acquired for the development of energy budgets. The data gained will also be used as a means of more accurately predicting shrimp production in Louisiana. (Smith-PAI)
W71-11279

EFFECTS OF SALINITY AND WATER QUALITY ON SURVIVAL AND GROWTH OF JUVENILE POMPANO, TRACHINOTUS CAROLINUS,
Louisiana State Univ., Baton Rouge. Div. of Fisheries.
Kenneth O. Allen, and James W. Avault, Jr.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 147-155. 4 tab, 1 plate, 3 ref. NSF GRANT GH-47.

Descriptors: *Fish farming, *Fish, *Juvenile fishes, Cultivation, Laboratory, Salinity, Salt tolerance, Water quality, Brackish, Growth rates, Chemical analysis, Water pollution effects, Florida, Louisiana.
Identifiers: *Pompano, Mariculture, Trachinotus carolinus, *Grand Isle (La).

The ecology and environmental requirements of the pompano, Trachinotus carolinus, are studied as a potential species for mariculture, mainly in Florida. Pompano is also found along the Louisiana coast, usually in waters of moderate to high salinity. But there are indications that it could be maintained in low salinity marshes. Juvenile pompano were collected from the surf at Grand Isle, and laboratory tests were conducted for effects of salinity and water quality on survival and growth. Tests for salinity depression tolerance ranged from 0.5 to 8.0 ppt salinity and results are tabulated. All surviving fish were active and feeding at the end of 72 hours. Tests for growth and survival were conducted at 5, 10, 15 and 23 ppt salinity. Survival was poor at all salinities and mean total length increased from 41.85 mm to 43.25 mm in 42 days. Analyses showed that poor growth and survival were due to organic wastes rather than salinity levels. Water quality was analyzed for oxygen, carbon dioxide, pH, ammonia and nitrates. It appears that the juvenile pompano produced considerable nitrogeneous wastes, which contributed to mortalities, but provisions could be made for removal of such wastes. Juvenile pompano can be stocked in waters with salinities as low as 3.5 ppt but tolerance of older pompano is not yet known and may well be less. (Smith-PAI)
W71-11280

DEVELOPMENT OF RATIONS FOR ECONOMICALLY IMPORTANT AQUATIC AND MARINE INVERTEBRATES,
Louisiana State Univ., Baton Rouge. Div. of Fisheries.

S. P. Meyers, J. W. Avault, Jr., J. S. Rhee, and D. Butler.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 157-172. 2 fig, 7 tab, 20 ref. NSF Grant GH-47.

Descriptors: *Invertebrates, *Diets, *Pink shrimp, *Crayfish, *Shrimp, Nutrient requirements, Growth rates, Economics, Productivity, Test procedures, Foods, Nutrients.
Identifiers: Mariculture.

Nutritional requirements of invertebrates, with special reference to Louisiana red swamp crawfish and post-larval pink shrimp, are studied for evaluation of invertebrate diets. A basic objective of the study is the utilization of fish protein concentrate (FPC) and single-cell protein (SCP) for maricultural purposes. Two general types of rations were examined, a pelletized form and an encapsulated type. Food uptake, animal behavior and weight gain of the specimens were observed. Little is yet known about the effect of supplemental feeding on crawfish development. Mean weight gain and percent survival increased proportionally with water hardness to 100 ppm. Responses of young crawfish to the pelleted ration are tabulated. Post-larval shrimp responded equally well to SCP capsules as the ration and to the combination of SCP and MPC (Marine protein concentrate). Desirable qualities for development of a ration for invertebrates are: Low cost and optimal nutritional composition; an effective binder for a pelleted ration to prevent disintegration; synthetic additives which will attract the shrimp, reduce disease and comply with governmental quality regulations; carefully designed nutrient microcapsules containing required hormones and regulatory substances for best development of the animal. The formulation of the ration will vary as more nutritional and organoleptic data are evaluated. (Smith-PAI)
W71-11281

GROWTH OF SPARTINA PATENS AND S. ALTERNIFLORA AS INFLUENCED BY SALINITY AND SOURCE OF NITROGEN,
Louisiana State Univ., Baton Rouge. Dept. of Botany.
James G. Gosselink.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February 1970, p 97-110. 10 tab, 11 ref. NSF Grant GH-47

Descriptors: *Marsh plants, *Growth rates, *Chemical analysis, Marshes, Grasses, Environmental effects, Laboratory tests, Salinity, Nitrogen, Nutrients, Louisiana.
Identifiers: *Barataria Bay (La), Spartina patens, Spartina alterniflora.

Species of the genus Spartina comprise the dominant vegetation of saline and brackish coastal marshes and are major contributors of organic matter for highly productive bird, game and fish areas. The nutrient and osmotic relationship of salt marsh grasses is being studied. S. alterniflora and S. patens are considered facultative halophytes because they grow more vigorously in fresh water than in saline or brackish water. Plants of both species were dug from two areas, varying in salinity, of the marshes of Barataria Bay. The roots were washed and they were planted in silica sand mixed with 0.5 percent CaCO3 and kept in the greenhouse. The composition of the nutrient solutions used is tabulated. Solution chloride level was monitored and plant tissue chloride was measured. Survival and growth of S. patens plants was excellent, but active growth of S. alterniflora was slow and more plants died. Effects of the various nutrients are detailed. Results show that growth is inversely related to the salinity of the nutrient solution, and the source of nitrogen had no statistically significant influence on fresh and dry weight of the plants. As the salinity increased, tissue sodium and chloride increased in the above-ground portions of the plants. It is estimated that at one and two percent external NaCl, the plant cells must be expending energy to accumulate chloride and exclude sodium. (Smith-PAI)
W71-11282

A COMPARISON OF THREE MEDIA IN DETERMINATION OF BACTERIAL CONTENT OF SEDIMENTS IN BARATARIA BAY,
Louisiana State Univ., Baton Rouge. Dept. of Microbiology.
Mary A. Hood, and Arthur R. Colmer.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 125-133, 6 tab, 7 ref. NSF Grant GH-47.

Descriptors: *Sediments, *Aquatic bacteria, Sediment yield, *Estuarine environment, Bacteria, Bays, Lakes, Sampling, Organic matter, Measurement, Laboratory analysis, Microbiology, Louisiana.
Identifiers: *Barataria Bay (La).

Bacteria are important consumers and producers of organic matter in estuaries, and the extent of the bacterial populations in waters, muds and surrounding vegetation of Barataria Bay was investigated. A proper medium for supporting the highest bacterial population had to be selected. Artificial sea water at first, then aged natural sea water, was used for dilution blanks. The three substrate media used for standard plate counts were Zobell's medium 2216, the TGE medium of Standard Methods, and the American Petroleum Institute agar for sulfate reducers. The technique used for bacterial determination was the surface smear method. The plates were incubated at 30 C for four days, and a Quebec colony counter was used to count developing colonies. Samples were taken in May and September from a lake in the northern area, one in the intermediate zone, and a third in the southernmost or most saline site. Statistical analysis by split plot design was done and orthogonal comparisons made to evaluate differences among individual media. It was found that the API formulation was significantly better for supporting growth of the sediment bacteria. (Smith-PAI)
W71-11284

HYDROLOGIC AND SHRIMP POPULATION MODELS,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
Simon Hacker, Charles Billups, Bert Wilkins, Jr., and Ralph W. Pike.
Coastal Studies Bulletin No. 5, Special Sea Grant Issue, February, 1970, p 25-40, 3 fig, 8 ref. NSF Grant GH-47.

Descriptors: *Ecosystems, *Fish populations, Estuaries, *Mathematical models, Bays, Lakes, Hydrology, Data processing, Systems analysis, Aquatic productivity, Shrimp, Research facilities, Louisiana.
Identifiers: *Barataria Bay (La).

To accomplish the objective of developing accurate mathematical models of the ecosystem of a typical saltwater marsh lake in Barataria Bay, and of developing techniques for using these models for prediction of optimal aquacultural yields, a systems analysis is being performed to delineate the specific subsystems which will be modeled. The models being integrated with other research efforts are: hydrodynamic model, energy balance model, material transport model, shrimp production model and data management system. Work has been initiated on all phases of the project, and is proceeding most rapidly in the hydrodynamic model, the shrimp production model for which equations are given and discussed, and the data management system which makes the data acquired easily accessible to all members of the program. It consists of two data files and three Fortran computer programs and includes an updating program. Considerable effort is being put into printing and plotting data in order to make it more readily available for analysis and correlation. Short-range plans will continue these studies and it is hoped will provide a detailed picture of the flow in the entire Barataria Bay. Turbulent mixing and the washing of detritus from the marsh will be predicted and information will be available on the hydrodynamic and shrimp production model results. Long-range research plans are outlined. (Smith-PAI)
W71-11285

SOME NOTES ON FISH COLLECTED IN THE BARATARIA BAY, LOUISIANA REGION,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
Jim Thomas, and Harold Loesch.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 83-87, 1 tab, 4 ref. NSF Grant GH-47.

Descriptors: *Sampling, *Estuarine environment, *Fish, Catfishes, Bays, Data collection, Fishing, *Fish populations, Speciation, Lakes, Louisiana.
Identifiers: *Barataria Bay (La), Anchovies, Croakers, Lizardfishes, Puffers.

Twelve stations in Barataria Bay were sampled with a shrimp trawl fourteen times from February to December, 1969. A table shows the stations where each of the 37 species identified was collected. The most abundant species was Anchoa mitchilli (bay anchovy), taken in considerable quantities and in large size ranges at all stations. It was the only species of anchovy found in this estuarine environment. Micropogon undulatus (croaker) was also taken at all stations, but in varying amounts during the year. As specimens became larger they were collected in increasing numbers at the southern stations, suggesting that most of the fish move from low salinity ranges in the northern part to higher ranges in the south, and then into the Gulf. The next most abundant species was Galeichthys felis (sea catfish), the largest proportion of the catch in July to October. Numbers decreased sharply as the water temperature dropped. Only a few specimens of Bagre marinus (gafftop catfish) were collected at three of the stations. Synodus foetens (inshore lizardfish) and Sphaeroides nephulus (southern puffer) occurred at the southern stations. Six species of scianid and five species of gobioid fishes provided the best represented families. A greater diversification of species can be expected with higher salinities at the southern stations in January and February. (Smith-PAI)
W71-11286

A DATA ACQUISITION SYSTEM FOR MEASUREMENT OF METEOROLOGIC-HYDROLOGIC PARAMETERS IN A REMOTE ESTUARINE ENVIRONMENT,
Louisiana State Univ., Baton Rouge. Office of Sea Grant Development.
Rodney Adams.
Coastal Studies Bulletin No 5, Special Sea Grant Issue, February, 1970, p 9-23, 10 fig, 1 tab, 1 plate, 3 ref. NSF Grant GH-47.

Descriptors: *Data collections, *Estuarine environment, *Remote sensing, *Instrumentation, *Estuaries, Data processing, Bays, Louisiana, Meteorological data, Hydrological aspects, Ecology, Biology, Hydrodynamics.
Identifiers: *Barataria Bay (La).

The choice of instrumentation for use in a remote location was limited by the necessity of D.C. operation and the requirement to operate for 30 days unattended in brackish water. The available systems and their manufacturers are listed, and the use of multiple recorders was favored in this case. The study areas were in both brackish and freshwater portions of the Barataria Bay estuary for the monitoring of all major tidal inlets. The instruments were of varying complexity for biologic, hydrodynamic and ecologic systems and analysis. Wind speed and direction measurements required an instrument with a low threshold and high accuracy and measurements were recorded on punched paper tape. Instruments used for measuring sun and sky radiation, net radiation, precipitation, temperature, evaporation, conductivity, water level and current velocity are described and illustrated. The

output from the punched paper tape recorders is translated into punch cards for use in a digital computer. Instrument housing was made strong enough to be as tamperproof and resistant to gunfire as possible. Barnacles and filamentous algae fouled the submerged sensors after a period of time and coatings were used as inhibitors. (Smith-PAI)
W71-11287

SEDIMENT DISCHARGE OF RIVERS AND THE FORMATION OF THE MARITIME TERRITORY SEACOAST (Tverdyy stok rek i formirovaniye morskikh beregov Primor'ya),
V. I. Lymarev.
In: Metodika raschetov i prognozov stoka rek Dal'nego Vostoka, Dal'nevostochnyy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 27, Leningrad, p 117-123, 1968. 7 p, 19 ref.

Descriptors: *Sediment discharge, *Sediments, *Estuaries, *Aggradation, *Rivers, Bottom sediments, Alluvium, Suspended load, Deltas, Geomorphology, Seashores, Abrasion, Terraces (Geological), Beach erosion.
Identifiers: *USSR, *Maritime Territory, Amur Bay, Peter the Great Bay, Sea of Japan.

Recent geomorphological investigations, including those by the 1965 expedition of the Far Eastern University, have established the leading role of alluvial material in the dynamics of the aggradational shores of the Maritime Territory. At the same time there is a lack of hydrological data on the solid discharge of a number of geomorphologically important rivers which empty into the Sea of Japan. Solid-discharge observations should be made at the mouths of the following rivers, which have most typical coastal aggradational forms: (1) Yanchikhe (delta bulge), (2) Kuznetsova (the spits near the mouth), (3) Sudzukhe (barrier beaches near the mouth with separated lagoons), (4) Adimi, Samarga, Yedinka and Akhobe (alluvial-aggradational terraces), and (5) Amba, Mangugay, and Sidemi (alluvial marine plains). Further detailed geomorphological studies at the mouths of these rivers will make it possible to establish relationships between solid discharge and the amount of sediment in the aggradational coastal forms. This would define the rate of accretion of these forms and assist in predicting the further evolution of coastal areas in the vicinity of river mouths. (Josefson-USGS)
W71-11334

DEVELOPMENT OF BARRIER ISLAND LAGOONS: WESTERN GULF OF MEXICO,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
W. G. McIntire, and C. Ho.
Louisiana State University Coastal Studies Institute Technical Report No 92, 1969. 14 p, 6 fig, 12 ref. (Reprint of Lagunas Costeras, Un Simposio. Mem. Simp. Intern. Lagunas Costeras. UNAM-UNESCO, Nov. 28-30, 1967. Mexico, D.F. 1969). ONR Contract N00014-69-A-0211-0003, Project No NR 388 002.

Descriptors: *Sand bars, *Lagoons, *Quaternary period, *Sea level, *Sedimentation, Coasts, Sands, Sand spits, Waves (Water), Deltas, Clay minerals, Diagenesis, Weathering.
Identifiers: *Barrier islands.

The origin, development, and evolution of barrier island lagoons directly relates to geologic events which occurred during Quaternary times. Beach-barriers range from those with multiple ridges found near river mouths to single crested ridges which may span hundreds of coastal miles. Development of lagoons to their present state results from events relating to sea level rise during Quaternary times. Rates at which sea level rose during late Quaternary were not catastrophic and barrier beaches probably existed as continuous features to the present. Chemical and mineralogical studies of water and sediment samples, and radiocarbon dates from peats associated with lagoonal deposits along the Gulf of Mexico and western Australia coasts reveal the evolution of barrier lagoons. X-ray diffraction of clays showed high montmorillonite percentages from lagoons in humid areas in contrast to increasing illite and kaolinite toward arid areas. The nitrogen content also decreased with aridity. X-ray radiographs of undisturbed cords revealed details of the sedimentary history and diagenesis of sediments after deposition. (Knapp-USGS)
W71-11342

ANALYSIS OF MAJOR RIVER SYSTEMS AND THEIR DELTAS: PROCEDURES AND RATIONALE, WITH TWO EXAMPLES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02E.
W71-11344

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE COASTAL BASINS OF TEXAS,
Geological Survey, Austin, Tex.
J. F. Blakey, and H. L. Kunze.
Texas Water Development Board Report 130, June 1971. 49 p, 15 fig, 10 tab, 37 ref.

Descriptors: *Water quality, Coastal plains, *Surface waters, *Texas, *Chemical analysis, Streams, River basins, Water chemistry, Hydrologic data, Data collections, Reviews, Geology, Water pollution, Water supply, Oily water, Saline water intrusion, Streamflow, Flow rates.
Identifiers: *Texas coastal basins.

The eight coastal basins in Texas have combined drainage area of more than 19,000 square miles and include all of the 370 miles of the coast except for a few miles across the mouths of the major rivers. Most of the coastal region is a smooth, featureless, depositional plain with altitudes generally less than 200 feet above mean sea level. The activities of man are affecting the chemical quality of surface waters in the coastal basins. Low flows in many of the streams are being degraded to some degree by oil field and other industrial wastes and by irrigation-return flows. Surface waters of the coastal basins are generally of good chemical quality, and in streams receiving little or no man-made wastes, the dissolved-solids concentrations are generally less than 250 milligrams per liter. Recent regulations of the Railroad Commission of Texas should reduce the amount of oil-field brines reaching surface-water courses. (Woodard-USGS)
W71-11354

A NATIONAL OCEAN SURVEY PROGRAM REQUISITE TO POLLUTION RESEARCH AND CONTROL,
National Oceanic and Atmospheric Administration, Silver Spring, Md. Oceanography Div.
For primary bibliographic entry see Field 05G.
W71-11445

THE BIOLOGY OF THE ESTUARY,
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 05C.
W71-11460

THE TEXAS WATER PLAN AND ITS EFFECT ON ESTUARIES,
Bureau of Commercial Fisheries, Washington, D.C.
For primary bibliographic entry see Field 05C.
W71-11461

THE BIOLOGICAL EFFECTS OF ESTUARIES ON SHELLFISH OF THE MIDDLE ATLANTIC,
New York State Conservation Dept., Ronkonkoma. Div. of Marine Resources.
For primary bibliographic entry see Field 05C.
W71-11463

THE EFFECTS OF POLLUTION OF ESTUARIES OF THE NORTHWEST PACIFIC COAST,
Washington Univ., Seattle. Fisheries Research Inst.
For primary bibliographic entry see Field 05C.
W71-11464

THE SIGNIFICANCE OF AN ESTUARY ON THE BIOLOGY OF AQUATIC ORGANISMS OF THE MIDDLE ATLANTIC REGION,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
For primary bibliographic entry see Field 05C.
W71-11465

THE ECONOMICS OF QUANTITY VS QUALITY IN GREEN BAY,
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 02H.
W71-11473

MIXING PROCESSES IN GREEN BAY,
Wisconsin Univ., Madison. Marine Studies Center.
For primary bibliographic entry see Field 02H.
W71-11474

STORMS AND METEROLOGY OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program and National Oceanic and Atmospheric Administration, Silver Spring, Md.
Albert V. Hardy.
In: Proceedings, Coastal processes and shore protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971, Seminar Series No 1, p 13-18.

Descriptors: *Meteorology, *Storms, *Wind tides, Atmospheric pressure, Wind velocity, Bodies of water, Shores, Flooding, Tropical cyclones, Hurricanes, North Carolina.
Identifiers: *North Carolina coast.

Nature distributes heat from the equator and cold from the polar regions over the earth's surface by the fluid elements of air and water. Changes in weather are caused by detours such as storms. The state of motion in the atmosphere is pictured in the form of areas of high and low pressure, associated with wind movements. Winds from the east, blowing off the ocean onto the land, tend to take water along and raise tides as they impinge on the coast, thus increasing the destructive forces of wind and water on the beaches. Pressure patterns and winds change constantly but general features can be detected. On a yearly basis the most likely weather map is one in which pressure is high over the southeastern United States or nearby areas, so the prevailing winds in eastern North Carolina are likely to be from the southwest. However, the opposite situation occurs only slightly less frequently and winds from the east or northeast tend to occur persistently in September and October, bringing higher tides and the likelihood of wind and water damage. Results of strong pressure gradients may be tropical cyclones of hurricanes in summer and autumn, causing floods and damage to life and property. The North Carolina coast averages about two storms of tropical origin per year. (See also W71-11476 thru W71-11481) (Smith-PAI)
W71-11475

THE ECOLOGY OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
Arthur W. Cooper.
In: Proceedings, Coastal processes and shore protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971, Seminar Series No 1, p 19-23.

Descriptors: *Ecology, *Coasts, *Environmental effects, Coastal structures, Balance of nature, Plant ecology, Degradation, Erosion, Sedimentation, Shores, North Carolina.
Identifiers: *North Carolina coast.

The North Carolina coast can be divided ecologically into two areas, the southern part where the barrier beach is close to the mainland, and the northern part where a narrow fringe of Outer Banks separate the ocean from the wide shallow sound. Evidence shows that the sea level is rising, causing natural erosion. Relatively undisturbed areas of the coast are compared with the rest which has suffered a slow destruction by natural forces and man's activities. The best type of vegetation for the dune community of this coast is sea oats, and behind the dunes shrubs grow, which in turn act as a protective barrier against salt-spray-laden winds for the coastal forests. Storms and natural causes account for a certain proportion of dune destruction and erosion, but man has caused most of the destruction of the natural vegetation, removing the protection from the effects of the sea and causing progressive degradation inland. Many inlets have been closed or are in the process of closing, thus trapping large quantities of sand, so they need to be stabilized. Salt marshes which provide food for marine animals have been modified and damaged by disposal of dredge spoil and as land fills, and need protection. Man must learn to interact less destructively with natural forces, plants and animals. (See also W71-11475) (Smith-PAI)
W71-11476

COASTAL EROSION IN NORTH CAROLINA,
North Carolina State Univ., Raleigh. Coastal Research Program.
L. Jay Langfelder.
In: Proceedings, Coastal processes and shore protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971, Seminar Series No 1, p 24-31. 2 fig.

Descriptors: *Coasts, *Sedimentation, *Aerial photography, Seashores, Measurements, Erosion, Deposition, Environmental effects, Dunes, High water mark, Low water mark, Winds, Tides, North Carolina.
Identifiers: *North Carolina coast.

Methods which can be used for investigation of wind and water erosion characteristics on North Carolina coastal areas are comparison of existing maps and charts, comparison of existing aerial photographs, new aerial photographs and short-term measurements or observations. Other possible procedures may be the study of sand movement and wave energy input. Existing aerial photographs provide records of the coastal environment, short-term changes and long-term patterns. It would be very useful to know volumes of material eroded or accreted, as well as areas of change. Errors in aerial photographs, such as scale variations and relief distortions can be minimized by using identical stable reference points. Composite mean annual rates of change, measured in feet per year, are shown for the North Carolina coast. Usually long-term changes at the dune line are found to be slightly larger than at the high-water line, and different sections of the coast show varying amounts of change, caused by orientation differences or different study periods. Environmental conditions account for many of the changes, and the frequency and severity of storms particularly affect the dune line. The predominant change in both lines is erosion, varying according to geographical location, the conditions prevailing and the effects of constructions such as artificial dunes. (See also W71-11475) (Smith-PAI)
W71-11477

METHODS OF COPING WITH COASTAL EROSION,
North Carolina State Univ., Raleigh. Coastal Research Program.
L. Vallianos.
In: Proceedings, Coastal processes and shore protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971, Seminar Series No 1, p 32-35.

Descriptors: *Beach erosion, *Sedimentation, *Erosion control, Bank protection, Diversion structures, Conservation, Shores, Coastal engineering, Dunes, Sedimentary structures, Waves, North Carolina.
Identifiers: *North Carolina coast.

Three general sediment conditions occur along shorelines, namely accretion, stability or erosion, and the causes of erosion are considered. A long-term natural cause is the rise in the world's sea levels due to continuous melting of ice caps. Sediments in motion along shorelines which encounter natural obstructions and entrapments, such as submarine canyons and shoals, are prevented from reaching the shore. Storm waves and tides cause short-term movement of sediment offshore and re-establishment is often too late to prevent damage to shoreline structures. Erosional conditions are also created by wave energy concentrations at given points on a coast, and by man's structures such as jetties at harbor entrances and walls to entrap sand to widen beaches, thereby starving adjacent shores of sediment. Destruction of sand dunes by development is yet another cause of erosion. There are various methods of shore protection, but it is an expensive undertaking. Sand by-passing is a method whereby floating dredging plants are used to physically move the material past the obstructions. Sea walls or breakwaters can be constructed in such a way as to prevent the wave energy from encroaching upon the beaches, and the addition of artificial sediment is a means of beach nourishment. Coastal dunes can be constructed to help protect the land and developmental restrictions should be implemented to prevent the destruction of the shoreline's natural protective features. (See also W71-11475) (Smith-PAI)
W71-11478

USE OF VEGETATION FOR DUNE STABILIZATION,
North Carolina State Univ., Raleigh. Coastal Research Program.
William W. Woodhouse.
In: Proceedings, Coastal processes and shore protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971, Seminar Series No 1, p 36-39.

Descriptors: *Dunes, *Stabilization, *Vegetation establishment, Erosion control, Grasses, Beach erosion, Vegetation effects, Plants, Winds, Tides, North Carolina.
Identifiers: *North Carolina coast.

Dunes must be stabilized against wind and overtopping by storm tides, and vegetation is the best means available for large-scale stabilization. However, vegetation is not effective against day-to-day beach erosion that takes place below the high-tide lines. Plants for dune stabilization must tolerate and survive sand accumulation, sand blast, salt spray, flooding by salt water, drought, high temperatures, low nutrient supply, and be able to hold sand against wind and water erosion. The best grasses for stabilization on the North Carolina coast are sea oats and American beachgrass for high dunes, and salt meadow cordgrass for low flats. Mixed plantings would reduce the risk of disease damage but there are availability limitations of sea oats, and cordgrass does not grow on the drier sites. Planting procedures have been worked out in detail for American beachgrass in regard to time, spacing, number of plants per area, and method. Dune plants will respond well to fertilization, especially at the beginning, though windblow sand does contain associated nutrients. A general rule is suggested for fertilization rpcedures. A recently developed variety of American beachgrass, Hatteras, is effective on the North Carolina coast and is now available. (See also W71-11475) (Smith-PAI)
W71-11479

DESIGN OF STRUCTURE AND STRUCTURAL MODIFICATIONS OF SPECIAL IMPORTANCE FOR NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
Donald D. Dean.
In: Proceedings, Coastal processes and protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971, Seminar Series No. 1, p. 40-41.

Descriptors: *Coastal structures, *Shore protection, Coastal engineering, Shores, Design criteria, Structural design, Strength of materials, Beach erosion, Winds, Rainfall, Currents, North Carolina.
Identifiers: *North Carolina coast.

Ocean shore buildings and structures are subject to such hazards as hurricane force winds and tornadoes, sand movement undermining foundations, torrential rain, water movement and current effects, wind-borne objects, water-borne objects and long-term beach erosion. Some simple and relatively inexpensive structural changes would improve the survival chances of near-shore structures. One important structural design principle for coastal buildings is that the connections between structural members must be able to develop the full strength of the members under all possible load conditions. The costs of correcting the improper connection type of construction fault is minor compared with the costs of the members being connected. The second principle comprises a unique design concept, namely that the building and its supporting pile group be braced in such a manner as to comprise a rigid body system independent of the types of ground support. The structure, therefore, is like a boat in that its ground supports are only called upon to hold it up, not together, so a general washout of the foundations will cause it to tilt or cantilever out over the hole but not fall apart. Alternative schemes based on this design principle were suggested and new design shapes and patterns proposed for future consideration. (See also W71-11475) (Smith-PAI)
W71-11480

ON THE LEGAL ASPECTS AND PROBLEMS OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
Thomas E. Kane.
In: Proceedings, Coastal processes and shore protection seminar, Wilmington, North Carolina, Coastal Plains Center for Marine Development Services, 1971. Seminar Series No. 1, p. 42-48.

Descriptors: *Legal aspects, *Dunes, *Beach erosion, Seashores, Beaches, Shore protection, Recreation, Construction, Ordinances, Statutes, Social aspects, North Carolina.
Identifiers: *North Carolina coast.

Increased use of the coastal areas for recreation purposes is beginning to conflict with other uses of the coastal zone and the maintenance of the natural environment. The legal aspects of the destruction of marshlands and sand dunes on the North Carolina coast, and the problem of beach erosion are discussed. Destruction of sand dunes is legally prohibited under the authority of the county commissioners who may establish a shore protection line. Local pressure from builders can make this statute difficult to enforce and only two out of the eight counties concerned have passed ordinances dealing with sand dune protection. In addition, beachfront development is only controlled seaward of the shore protection line. Sand dunes are also being damaged by dune buggies which destroy vegetation which acts as the anchor for the dune system. Legislation is now being drafted for the restriction of dune buggies. Federal law provides cost assistance for the construction, but not the maintenance, of works for restoration and protection of public shores against beach erosion. This brings into prominence the question of beach ownership. Man's activities and developments are all contributing to dune destruction and beach erosion. Possible solutions are the education of the public and developers, and recommendations for orderly use of the coastal zone by the Department of Conservation and Development. (Smith-PAI)
W71-11481

COMPETITION FOR NUTRIENTS BY MARINE PHYTOPLANKTON IN OCEANIC, COASTAL, AND ESTUARINE REGIONS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W71-11531

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

ACID MINE WASTE TREATMENT USING REVERSE OSMOSIS.
Gulf Environmental Systems Co., San Diego, Calif.
For primary bibliographic entry see Field 05D.
W71-11362

NEW AND ULTRA THIN MEMBRANES FOR MUNICIPAL WASTE WATER TREATMENT BY REVERSE OSMOSIS,
North Star Research and Development Inst., Minneapolis, Minn.
For primary bibliographic entry see Field 05D.
W71-11372

SURVEY OF DESALTING PROCESSES FOR USE IN WASTEWATER TREATMENT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05D.
W71-11390

3C. Use of Water of Impaired Quality

REINTERPRETATION OF DEEP ICE TEMPERATURES,
Department of Supply, Melbourne (Australia). Antarctic Div.
W. F. Budd, D. Jenssen, and U. Radok.
Nature Physical Science, Vol 232, No 30, p 84-85, July 26, 1971. 2 p, 2 fig, 10 ref.

Descriptors: *Glaciers, *Polar regions, *Ice, *Thermal properties, Arctic, Antarctic, Model studies, Computer programs, Analytical techniques.
Identifiers: *Glaciers (Temperature profiles), Ice sheets (Polar regions).

Computer calculations were made allowing for types of surface temperature changes for the first temperature profile through the Antarctic ice sheet. The calculations agreed with the observations to better than 0.4 deg C. The computer technique used makes possible a systematic variation of all relevant parameters in order to establish their optimum combination, that is, the combination giving the minimum standard deviation for the differences between the observed and computed temperatures. The first results of such an analysis of the Greenland temperatures are reported. The principal parameters in this context are the surface accumulation and the substantial rate of surface temperature change with time which depends on the ice flow velocity, the slope and temperature gradient along the ice surface, and changes in the elevation of the cap surface as well as in climatic conditions. (Woodard-USGS)
W71-11080

EFFECT OF IRRIGATION WITH EFFLUENTS FROM THE VOLGA CHEMICAL COMBINE ON THE AGROMELIORATIVE CHARACTERISTICS OF LIGHT CHESTNUT CLAY LOAM SOILS (Vliyaniye orosheniya stochnymi vodami Volzhskogo khimkombinata na agromeliorativnyye pokazateli tyazhelosuglinistykh svetlo-kashtanoyykh pochy),
For primary bibliographic entry see Field 05C.
W71-11327

3D. Conservation in Domestic and Municipal Use

PLANNING AND MANAGEMENT OF WATER RESOURCES IN METROPOLITAN ENVIRONMENTS,
George Washington Univ., Washington, D.C. Natural Resources Policy Center.
For primary bibliographic entry see Field 06B.
W71-10970

APPLIED CRITERIA FOR MUNICIPAL WATER RATE STRUCTURES,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 06C.
W71-11203

APPLIED CRITERIA FOR MUNICIPAL WATER RATE STRUCTURES, HANDBOOK,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 06C.
W71-11204

3F. Conservation in Agriculture

COMPUTER SIMULATION PROGRAMMING: AN AID TO THE SELECTION OF CENTER PIVOT SPRINKLER SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering; and North Dakota State Univ., Fargo. Dept. of Soils.
E. C. Stegman, and A. Bauer.
Canadian Agricultural Engineering, Vol 12, No 2, p 92-97, November 1970. 6 p, 4 fig, 1 tab, 6 ref. OWRR Project B-007-N DAK (3).

Descriptors: *Irrigation design, *Sprinkler irrigation, *Mathematical models, *Simulation analysis, Sprinkling, Optimization, Computer programs.
Identifiers: Center-pivot sprinkler systems.

A computational model was designed to simulate the operation of center pivot irrigation systems. This model is particularly suited to studies which seek to determine when and where given systems may be used to irrigate more than one tract of land. Because most manufacturers sell a basic unit capable of conveying a wide range of pumping rates, it is assumed that pivot system utilization may be optimized by determining how much land a given unit can irrigate. The program was developed around a soil moisture balance equation which was expanded to include the time factor associated with water applications by sprinkler systems. An example application of the model was given to illustrate some of the potential uses for simulation programming in system design and selection. (Knapp-USGS)
W71-11112

FOOD SCIENCE AND MARICULTURE,
Louisiana State Univ., Baton Rouge. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 02L.
W71-11271

MARICULTURE IN THE UNITED STATES-AN OVERVIEW,
Louisiana State Univ., Baton Rouge. Div. of Fisheries.
For primary bibliographic entry see Field 02L.
W71-11276

ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT - TECHNOLOGY AND ECONOMICS, PHASE I,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 05B.
W71-11405

SIMULATION OF THE HYDROLOGIC-ECONOMIC FLOW SYSTEM IN AN AGRICULTURAL AREA,
Utah Water Research Lab., Logan.
Murland R. Packer, J. Paul Riley, Harold H. Hiskey, and Eugene K. Israelsen.
Available from the National Technical Information Service as PB-202 213, $3.00 in paper copy, $0.95 in microfiche. Completion Report PRWG57-1, July, 1969, 92 p, 39 fig, 28 tab, 42 ref, 4 append. OWRR Project B-017-UTAH (2).

Descriptors: Evaluation, *Simulation analysis, *Model studies, *Irrigation efficiency, *Crops production, Management, Planning, *Water allocation (Policy), Productivity, *Marginal utility, Water supply.
Identifiers: *Hydrologic-economic complex, *Production functions, Marginal value.

Like the allocation of water resources among water users, the distribution of allocated water to the subusers requires an estimate of the economic costs and benefits from a number of distribution alternatives. The most satisfactory solution maximizes the benefit cost ratio. This study is based on the premise that equitable water distribution to agricultural subusers can be more easily accomplished through the use of a technique to predict the marginal value of agricultural water. A hydro-economic model is formulated to distribute the water supply to the crops and to determine the unit value of water for the given supply. By incrementing the supply, the marginal value of water for a given cropping pattern is determined. Water is in short supply if the potential evapotranspiration of all of the crops can not be satisfied. The link between the economic and hydrologic systems is the production function which is the relationship between the actual evapotranspiration and the yield of the crop. Other variables affecting crop production are assumed to be relatively constant. The simulation model is applied to a prototype system to demonstrate the applicability of the model to management and planning problems. The model provides a means of determining the marginal value of water in water short years were potential evapotranspiration of all crops can not be met.
W71-11407

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

OPTIMAL RELEASE RULE FOR OPERATING A FINITE DAM,
Indian Inst. of Management, Calcutta.
Manish C. Bhattacharjee.
OPSEARCH, Journal of the Operational Research Society of India, Vol 8, No 1, p 33-44, March 1971. 12 p, 2 ref.

Descriptors: *Dams, *Water delivery, Time, Optimization, Input-Output analysis, Dynamic programming, Structural analysis, Management.

Water was released from a dam of finite capacity (K) at discrete time points which were equidistant. The time separation between two consecutive points when the option of releasing water from the dam was exercised was long enough as would justify considering the input sequence. (An input was the total amount of water flowing into the dam between opportunities of releasing water from the dam.) The time points where these options were used were the decision points. At any decision point was the option to release any amount of water out of the total quantity in the dam. Releases were assumed to be instantaneous. Two different criteria were considered: to minimize the probability of ruin for any finite horizon, and to maximize the expected time to ruin. These dynamic programming

problems were studied along with policies (release rules) which were optimal with respect to either criteria. The conceptual framework was that of Blackwell. Under fairly reasonable conditions on the input distribution, a simple non-randomized stationary release rule optimal with respect to both criteria was shown. Only structural specifications were assumed for the input distribution. The analysis of the stationary best policy showed that it remained optimal for a wider class of input distributions. (Veverka-Cornell)
W71-10982

OPTIMUM WATER MANAGEMENT UNDER THE TEXAS WATER PLAN,
Texas A and M Univ., College Station; and Texas Water Development Board, Austin.
W. L. Meier, Jr., A. O. Weiss, and C. D. Puentes.
Proceedings of 14th Congress of International Association for Hydraulic Research, Hydraulic Research and its Impact on the Environment, Vol 5, p 422-1--422-4, 29 August-3 September 1971. 4 p, 1 fig, 4 ref.

Descriptors: *Water management (Applied), *Texas, *Water resources, Reservoirs, Systems analysis, Optimization, Planning, Pumps, River systems, Supply, Demand, Costs.

In 1968, the Texas Water Development Board published the Texas Water Plan which involved a major redistribution of the State's water resources. This paper provided a status report on the comprehensive use of systems analysis and optimization techniques in the planning of a large interregional water regulation and transfer system forming a part of the proposed Texas Water System. The physical system analyzed included 12 reservoirs, 25 pump canals, and 8 river reaches stretching over 700 miles and lifting water from supply to demand area through a difference in elevation of 3500 ft. The initial proposed capital cost of the proposed system was approximately 10 billion dollars. Techniques found useful in analyzing this system were: quantification of objectives and goals, data base development, plan development, plan improvement, plan optimization, and final plan selection. The strategy for using these techniques in the analysis of this large-scale system was described. The project represented one of the most comprehensive uses of systems analysis and optimization techniques in the analysis of a water resource planning problem. (Veverka-Cornell)
W71-10986

COTTONWOOD CREEK DAM, IDAHO PROJECT.
Corps of Engineers, Walla Walla, Wash. Walla Walla District.

Available from the National Technical Information Service as PB-198 724, $3.00 in paper copy, $0.95 in microfiche. Draft environmental statement, 23 April 1971. 10 p.

Descriptors: *Dams, *Environmental effects, *Flood control, *Landfills.
Identifiers: *Environmental surveys, *Idaho, *Environmental impact statements, *Boise (Idaho), Cottonwood Creek.

Cottonwood Creek project is to provide local flood protection to the eastern portion of the city of Boise, Idaho. The project planned would require 192 acres of land and would consist of a dam located approximately 200 feet below the confluence of Cottonwood and Freestone Creeks at the northeast city limits. The dam would be an earth and rockfill structure 117 feet high at crest elevation 2889. Streamflow is not dependable enough to create a good permanent lake behind the dam. The dam would become a major visual element extending across the foothill canyon. A small amount of wildlife would be displaced from habitat eliminated from lands occupied by the dam, spillway, and parts of the impoundment area. Sediment periodically trapped behind the dam would cover the existing canyon bottom and eliminate existing vegetative ground cover. No major adverse impact is foreseen.
W71-10989

NOOKAGEE DAM, WESTMINISTER, MASSACHUSETTS.
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-198 703-D, $3.00 in paper copy, $0.95 in microfiche. Draft environmental statement, 14 April 1971. 3 p.

Descriptors: *Dams, *Environmental effects, *Flood control, Water quality control, Land fills, Sedimentation.
Identifiers: *Environmental surveys, *Westminister, Massachusetts, *North Nashua River, *Nookage Dam, *Environmental impact statements.

The proposed project, one element in a complex of dams and local protection facilities proposed in the North Nashua River Basin, is located on Phillips Brook in Westminister, Worcester County, Massachusetts, about four miles northwest of the city of Fitschburg, Massachusetts. The project purposes are flood control, water quality improvement by low flow augmentation, and limited recreational use. The dam will be of earth-fill construction, about 2,150 feet long, and about 106 feet high. The environmental impacts will be the loss of approximately 300 acres of field and woodland, and a 190 acre pool. Pollution in the North Nashua River will be abated, thus assisting in upgrading water quality from nuisance to Class C quality. Fishing opportunities will be increased. Yearly drawdown will expose about 100 acres from bottom. Effects which cannot be avoided will be a temporary increase in turbidity during construction.
W71-10992

LAPWAI CREEK, CULDESAC, IDAHO, PROJECT.
Corps of Engineers, Walla Walla, Wash. Walla Walla District.

Available from the National Technical Information Service as PB-198 715-D, $3.00 in paper copy, $0.95 in microfiche. Draft environmental report, 1 Apr 1971. 6 p.

Descriptors: *Environmental effects, *Flood control, *Channel improvement, *Levees, Flow.
Identifiers: *Environmental surveys, *Idaho, Stream flow, *Environmental impact statements, *Culdesac (Idaho).

The project would consist mainly of stream channel renovation with an earth and rock levee (about 10 feet high and 12 feet wide on top) extending for 3,200 feet on the left bank of the creek in the village of Culdesac, Idaho. The proposed prospect would provide flood protection. Fish and wildlife resources would not be significantly affected. A small amount of riparian vegetation would be removed and a rock quarry would be created. Temporary disruption would occur as the work is carried out.
W71-10993

A MODEL FOR SURFACE DRAINAGE OF CULTIVATED FIELDS,
Technion - Israel Inst. of Tech., Haifa. Dept. of Agricultural Engineering.
Ido Seginer.
Journal of Hydrology, Vol 13, No 2, p 139-152, June 1971. 14 p, 8 fig, 1 tab, 3 ref.

Descriptors: *Furrow drainage, *Surface drainage, *Mathematical models, *Model studies, *Drainage systems, Contour furrows, Numerical analysis, Roughness (Hydraulic), Water storage, Overland flow, Topography, Soil conservation, Land reclamation.

The drainage pattern and surface storage capacity of cultivated fields can be simulated by means of a model in which furrows and random roughness are superimposed over the general topography of the field. Calculations with such a model show that the surface storage capacity increases with the depth of contour furrows and with the roughness, and decreases with increasing slope. The rate of convergence of the flow along the slope increases with increasing depth of furrows and decreases with increasing slope. The effect of roughness is such that there seems to exist a limit to the rate of convergence for increasingly rough surfaces. The model can be used as an aid in surface drainage design, but must first be checked in the field to establish relationships between measurable quantities of the actual topography and the values of the parameters of the model.
W71-11070

EVALUATION OF STREAMFLOW-DATA PROGRAM IN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02E.
W71-11132

FLOW THROUGH ROCKFILL DAM,
For primary bibliographic entry see Field 08D.
W71-11156

FLOODS OF NOVEMBER 1965 TO JANUARY 1966 IN THE GILA RIVER BASIN, ARIZONA AND NEW MEXICO, AND ADJACENT BASINS IN ARIZONA,
Geological Survey, Washington, D.C.
B. N. Aldridge.
For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402--price $2.50. Geological Survey Water-Supply Paper 1850-C, 1970. 176 p, 2 fig, 6 plate, 9 tab, 21 ref.

Descriptors: *Floods, *Arizona, *Flood control, *Reservoirs, *Rainfall-runoff relationships, Discharge (Water), Peak discharge, Arid lands, Flash floods.
Identifiers: *Gila River Basin (Ariz).

Above-normal precipitation, which fell over much of Arizona and New Mexico in November and December 1965 during five distinct storm periods, caused flooding in several parts of the Gila River below Salt River. The most significant flood was the Phoenix flood, which resulted from the release of water from storage reservoirs on the Salt and Verde Rivers. Reservoirs were at an unusually high level for December. The regulated discharge in the Salt River below Granite Reef Dam was the highest since the reservoir system was completed in 1939. The maximum discharge of the Salt River through the downtown area during the Phoenix flood was 66,000 cfs. Without the storage provided by the upstream reservoirs, the peak discharge during the flood would have been more than 80,000 cfs, and the peak discharge on December 23 might have exceeded 120,000 cfs. More than 500,000 acre-feet of water passed over Granite Reef Dam, but only 37,000 acre-feet of water reached the mouth of the Gila River. Rises in groundwater levels in the flood plains indicate that a large amount of the streamflow loss went to groundwater recharge. (Knapp-USGS)
W71-11251

FLOOD PLAIN INFORMATION, EAST BRANCH PERKIOMEN CREEK, BUCKS COUNTY, PENNSYLVANIA.
Corps of Engineers, Philadelphia, Pa.

Army Corps of Engineers Flood Plain Report, January 1971. 47 p, 8 fig, 12 plate, 11 tab.

Descriptors: *Floods, *Flood damage, *Flood plains, *Pennsylvania, Regional flood, Flood forecasting, Flood control, Historic flood, Peak discharge.

Identifiers: *Floods (Buck County, Penn), Standard project flood, Intermediate regional flood.

The flood situation along East Branch Perkiomen Creek in Bucks County, Pennsylvania is described to aid in solving local flood problems and in planning the best utilization of flood-prone lands. Maps, profiles, cross sections and other material relating the extent of past flooding to floods which might occur in the future are based on available records of rainfall, runoff, historical flood heights and other technical data. Except for the Boroughs of Sellersville and Perkasie, those portions of Bucks County within the study area are predominantly rural. The flood plains are either used for agricultural purposes or are lightly wooded. A considerable portion of the flood plain areas located within the two boroughs has been developed for municipal park purposes. The remaining areas are utilized for residential, commercial and industrial purposes. Many of these facilities have suffered damage from past floods and a still larger number are vulnerable to damage from future floods of greater magnitude such as the Standard Project Flood. (Woodard-USGS)
W71-11257

FLOOD PLAIN INFORMATION, MECKLENBURG COUNTY, NORTH CAROLINA, VOLUME 3. MALLARD CREEK, TOBY CREEK AND DOBY CREEK.
Corps of Engineers, Charleston, S.C.

Army Corps of Engineers Flood Plain Report, April 1971. 40 p, 11 fig, 22 plate, 11 tab.

Descriptors: *Floods, *Flood damage, *Flood plains, *North Carolina, Regional flood, Flood forecasting, Flood control, Historic flood, Peak discharge.
Identifiers: *Floods (Mecklenburg County, N.C.), Standard project flood, Intermediate regional flood.

The flood situation along Mallard Creek and two of its tributaries, Toby and Doby Creeks, in Mecklenburg County, North Carolina is described to aid in solving local flood problems and in planning the best utilization of flood-prone lands. Maps, profiles, cross sections and other material relating the extent of past flooding to floods which might occur in the future are based on available records of rainfall, runoff, historical flood heights and other technical data. Along the studied reaches of Mallard, Toby, and Doby Creeks, flood plain widths vary considerably. The Mallard Creek Valley is over 1,500 feet wide at several points in the lower study area, but tapers down to less than 100 feet at points in the upper reaches. Flood plain widths along Toby Creek average about 500 feet, but the Doby Creek Valley rarely exceeds 300 feet. (Woodard-USGS)
W71-11258

FLOOD PLAIN INFORMATION, YELLOW CREEK AND LITTLE YELLOW CREEK, BENNETTS AND STONY FORKS, AND DIVERSION CANAL, MIDDLESBORO, KENTUCKY.
Corps of Engineers, Nashville, Tenn.

Army Corps of Engineers Flood Plain Report, February 1971. 57 p, 13 fig, 15 plate, 10 tab.

Descriptors: *Floods, *Flood damage, *Flood plains, *Kentucky, Regional flood, Flood forecasting, Flood control, Historic flood, Peak discharge.
Identifiers: *Floods (Middlesboro, Ky), Standard project flood, Intermediate regional flood.

The flood situation on Yellow and Little Yellow Creeks, Bennetts and Stony Forks, and the Yellow Creek diversion canal in Middlesboro, Kentucky and vicinity is described to aid in solving local flood problems and in planning the best utilization of flood-prone lands. Maps, profiles, cross sections and other material relating the extent of past flooding to floods which might occur in the future are based on available records of rainfall, runoff, historical flood heights and other technical data. Because a substantial part of Middlesboro is situated on relatively flat land, there are numerous commercial, industrial, and residential developments that are vulnerable to major floods. Large portions of these lands have been inundated by floods of the past, and a considerably greater area is within reach of the potentially larger floods of the future. Many buildings not reached by the largest of previous floods would be severely damaged by a Standard Project Flood. (Woodard-USGS)
W71-11259

PROBABILITIES OF OBSERVED DROUGHTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W71-11345

MODELS FOR SUBSURFACE DRAINAGE,
Colorado State Univ., Fort Collins, Dept. of Agricultural Engineering; and Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 02G.
W71-11347

WEST FORK DES MOINES RIVER, JACKSON, MINNESOTA, LOCAL PROTECTION PROJECT.
Army Engineer District, Rock Island, Ill.

Available from the National Technical Information Service as PB-198 726, $3.00 in paper copy, $0.95 in microfiche. Draft Environmental Impact statement, March 1971. 7 p.

Descriptors: *Environmental effects, *Flood control, *Levees, *Recreation facilities.
Identifiers: *Environmental surveys, *Minnesota, *Environmental impact statement, Jackson, Minnesota, Des Moines River.

The project concerns flood control for the city of Jackson, Jackson County, Minnesota. The protection will consist of approximately 1.4 miles of earthen levee with an average height of 10 feet. About 0.1 mile of concrete floodwall will be built where space precludes the construction of levees. The walls will range in height from 3 to 10 feet. The project will provide protection for commercial and residential areas (100 businesses, 20 residences) of approximately 112 acres against flooding from the West Fork Des Moines River and Nelson Creek having a frequency of once in about 100 years. No adverse environmental impact is foreseen except for the reduction of the freedom of access to the river and the restricting of the view of the river. As a mitigation feature, a footpath over the levee will be developed near the power plant for fishing and viewing access.
W71-11411

ROCKFISH CREEK, NORTH CAROLINA FLOOD CONTROL PROJECT.
Corps of Engineers, Wilmington, N.C. Wilmington District.

Available from the National Technical Information Service as PB-198 706-D, $3.00 in paper copy, $0.95 in microfiche. Draft Environmental Impact statement, April 1971. 6 p.

Descriptors: *Environmental effects, *Channel improvement, *Flood control, *Fish, Streamflow, Sedimentation, Rivers, Wildlife.
Identifiers: *Environmental surveys, *North Carolina, *Environmental impact statements, *Duplin County (NC), *Rockfish Creek.

The Rockfish Creek flood control project is located in Duplin County, North Carolina. The major portion of the channel improvement consists of deepening and widening on one side of the channel only, thus leaving one side uncleared and in the natural state. The project is expected to have no effect on any present or future water supply and will effect water quality only during construction. Both a pond and wildlife area are being provided to mitigate damages to the fish and wildlife resources in the project area. These damages are estimated at a loss of about 80 percent of the standing crop of fishes in the reaches to be channelized and a loss of about 251 acres of cover due to clearing. The changes in vegetative types due to reduced wetlands will benefit certain types of wildlife and respect a loss to other types.
W71-11413

TETON BASIN PROJECT, IDAHO, APRIL, 1971.
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 06G.
W71-11414

STUART GULCH DAM, IDAHO, PROJECT.
Corps of Engineers, Walla Walla, Wash. Walla Walla District.
For primary bibliographic entry see Field 06G.
W71-11415

CLEAR CREEK, TEXAS, FLOOD CONTROL.
Army Engineer District, Galveston, Tex.

Available from the National Technical Information Service as PB-198 725, $3.00 in paper copy, $0.95 in microfiche. Draft Environmental Statement, Feb 12, 1971. 12 p.

Descriptors: *Texas, *Environmental effects, *Channel improvement, *Flood control, Streamflow, Sedimentation, Construction, Dredging.
Identifiers: *Environmental survey, Environmental surveys, Floodways, *Environmental impact statements, *Clear Creek, Brazoria County (Tex), Galveston County (Tex), Harris County (Tex).

The Clear Creek, Texas, flood control project would provide flood protection to the rapidly urbanizing areas adjacent to the stream in Brazoria, Galveston, and Harris Counties through enlargement and rectification of the natural stream channel. The sharper bends would be cut off to improve the channel alignment, resulting in an improved channel length of about 31 miles. The size of the improved channel would vary from a bottom width of 200 feet at the lower end to 76 feet in the upper reaches. The improvement, as authorized, would provide full protection from floods having a frequency of occurrence of once in about 100 years. The removal of brush, undergrowth, weeds, and some trees within the banks of the improved floodway will remove natural habitat and vegetative cover for small animals and birds. Excavation will eliminate relatively small amounts of marsh land. Temporary increase of turbidity during construction would have no permanent effect on water quality.
W71-11416

USE OF VEGETATION FOR DUNE STABILIZATION,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11479

STREET DEPARTMENT MAINTAINS SMALL BOAT CHANNELS,
St. Petersburg Street Dept; Fla.
T. E. Goodrow.
Public Works, Vol 102, No 7, p 55-56, July 1971, 1 fig, 1 photo.

Descriptors: *Channel improvement, *Dredging, Florida, Channels, Fishing, Water purification.
Identifiers: *St. Petersburg (Fla), *Small boat channels, Dredge fill permit.

Small boat traffic maintenance in St. Petersburg, Florida is discussed. The Department of Streets is responsible for dredging small boat channels. Some of the steps involved in obtaining a dredge fill permit are discussed. Since the commencement of the dredging operation there have been improvements in fishing and the water has cleared substantially. (Strachan-Chicago)
W71-11602

ENVIRONMENTAL PLANNING ENHANCES FLOOD CONTROL PROJECT.

Public Works, Vol 102, No 7, p 77. July 1971, 3 fig.

Descriptors: *Environment, *Planning, *Flood control, *Recreation facilities, California.
Identifiers: *Alameda Creek, *Environmental planning concepts.

Some of the environmental planning concepts are discussed involved in the Alameda Creek Flood Control Project authorized by Congress in 1962. The Project will provide an increased water supply to the growing population of the Alameda Creek basin, which is located near San Francisco, will offer more protection of property through flood control, and finally, it will make channel improvements along the stream. Included in the functional aspects of the Project are plans for bicycle paths, horseback riding trails, staging areas, picnic facilities, landscaping and plantings in the proximity of the Creek, which will encourage the use of the Creek and its surrounding area for recreation purposes. (Strachan-Chicago)
W71-11612

4B. Groundwater Management

MODERN TECHNIQUES IN GROUND-WATER STUDIES,
Department of Water and Power, Los Angeles, Calif.
Dennis E. Williams.
Journal American Water Works Association, Vol 63, No 7, p 433-438, July 1971. 6 p, 9 fig, 1 tab, 4 ref.

Descriptors: *Groundwater, *Management, *Transmissivity, *Storage, *Aquifers, Reservoirs, Wells, Casings, Pumping, Mathematical models, Simulation analysis, Digital computers, Optimization, Planning.

A testing procedure for ascertaining the transmissivity and storage characteristics of ground-water reservoirs and a mathematical model for predicting future developments were outlined. The step-drawdown test provided a convenient guide for well-redevelopment work by estimating the present conditions of the well casing. Regional aquifer response due to the interface of well fields was analyzed by the principal of superposition. Data from pumping tests provided insight into formation characteristics and controlled the design of wells and pumps, the spacing between wells, and the amount of water that safely could be withdrawn from, or added to, aquifer storage during any given time period. One useful tool in acquiring knowledge of reservoir behavior under various pumping and recharge regimens was a digital simulation model. This model mathematically blended the geologic and hydrologic properties of the reservoir and solved specific recharge-discharge requirements imposed on the area by use of a digital computer. These predictive models were used to manage ground-water resources by quantity and quality simulation in such a manner as to optimize the water needs, both for export and local use. (Veverka-Cornell)
W71-10984

COMPARISON OF METHODS FOR EVALUATING AQUIFER CHARACTERISTICS,
Hittman Associates, Columbia, Md. Environmental Sciences and Engineering Dept.
For primary bibliographic entry see Field 02F.
W71-11215

DRAWDOWN IN A WELL GROUP ALONG A STRAIGHT LINE,
Northwestern Univ., Evanston, Ill. Technological Inst.; Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering; and Wisconsin Univ., Milwaukee. Dept. of Mechanics.
For primary bibliographic entry see Field 02F.
W71-11216

HYDROGEOLOGY IN CZECHOSLOVAKIA,
Engineering-Geological and Hydrogeological Survey, Prague (Czechoslovakia). Groundwater Div.
For primary bibliographic entry see Field 02F.
W71-11217

AVAILABILITY OF STREAMFLOW FOR RECHARGE OF THE BASAL AQUIFER IN THE PEARL HARBOR AREA, HAWAII,
Geological Survey, Washington, D.C.
G. T. Hirashima.
For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402--Price 25 cents. Geological Survey Water-Supply Paper 1999-B, 1971. 26 p, 13 fig, 5 tab, 6 ref.

Descriptors: *Water resources development, *Artificial recharge, *Saline water intrusion, *Conjunctive use, *Hawaii, Streamflow, Irrigation water, Municipal water, Discharge (Water), Withdrawal, Water demand, Urbanization.
Identifiers: *Pearl Harbor (Hawaii).

The Pearl Harbor area is underlain by an extensive basal aquifer that contains large supplies of fresh water. Because of the presence of a cap rock composed of sedimentary material that is less permeable than the basaltic lava of the basal aquifer, seaward movement of groundwater is retarded. The cap rock causes the basal water to stand at a high level; thus, the lens of fresh water that floats on sea water is thick. Discharge, which includes pumpage from the wells and shafts, averaged 250 million gpd during 1931-65. Because the water level did not decline, recharge must have been approximately equal to discharge. Increase in pumping may cause an increase in chloride content unless the increased discharge is balanced by increased recharge. Average annual direct runoff from the 90-square-mile Pearl Harbor area is 47.27 million gpd or 11.1 inches; this is 13.3% of the average annual rainfall. Average annual direct runoff in streams at the 800- and 400-foot altitudes is 29 and 38 million gpd, respectively. Because streams are flashy, only 60% of the runoff can be economically diverted to recharge areas. (Knapp-USGS)
W71-11253

GROUNDWATER LEVELS IN NEBRASKA, 1970,
Geological Survey, Lincoln, Nebr.
C. F. Keech.
Nebraska Water Survey Paper No 28, May 1971. 87 p, 10 fig, 1 tab, 17 ref.

Descriptors: *Water levels, *Groundwater, *Hydrologic data, *Nebraska, Data collections, Monitoring, Observation wells, Water wells, Water level fluctuations, Irrigation water, Water utilization, Evapotranspiration.
Identifiers: Groundwater data.

Measurements were made in selected wells in Nebraska, strategically located to indicate net water-level changes. All the important aquifers are represented by at least one observation well. Except for a few measurements and the 50 recording gages that continually monitor water-level fluctuations in the well, water levels are obtained in the fall, several weeks after the close of the irrigation season. Of the 35,292 registered irrigation wells, 1,501 were registered during 1970 with the Nebraska Department of Water Resources. Of the 93 counties in the State, 75 ended the 1970 year with average water levels in wells lower than the fall of 1969. Most counties were drier than normal. (Knapp-USGS)
W71-11256

ARTIFICIAL RECHARGE OF HYDROLOGICALLY ISOLATED AQUIFERS,
Texas Tech. Univ., Lubbock. Dept. of Agricultural Engineering.
S. A. Dennis, M. J. Dvoracek, and S. H. Peterson.
Available from the National Technical Information Service as PB-202 226, $3.00 in paper copy. Paper No 70-718, presented at 1970 Winter Meeting of the American Society of Agricultural Engineers, December 8-11, 1970, Chicago, Illinois. 32 p, 8 fig, 3 tab, 18 ref. OWRR Project B-014-TEX (5).

Descriptors: *Artificial recharge, *Texas, Aquifer characteristics, Water quality, Hydrogeology, Permeability, Infiltration, Pit recharge, Injection wells, Water conservation, Irrigation water.
Identifiers: *Isolated aquifers, *Ogallala aquifer.

Hydrologically isolated aquifers have unique problems related to their recharge. This type of aquifer may have limited natural recharge. One of the largest unconfined, hydrologically isolated, aquifers is the Ogallala, which underlies the Southern High Plains, of Texas, one of the largest agricultural areas in the United States. Over five million acres are irrigated using Ogallala groundwater alone. The major crops of the area are cotton, grain sorghum, wheat, and vegetables. Pumpage annually ranges from 4 to 8 million acre-feet. If a portion of the annual runoff water could be recharged into the Ogallala, the rate at which the groundwater is being depleted could be decreased. A major problem affecting all recharge methods is the quality of water. Since the most common source is runoff water, physical as well as chemical/biological pollution or contamination is possible. To date primary emphasis has been devoted to physical contamination (sediment). Pressure injection recharge wells do not seem to be affected by the use of highly turbid water. With periodic maintenance, pits, trenches, and spreading basins are best utilized in areas when a highly permeable layer lies at or very near the surface. (Knapp-USGS)
W71-11316

MATHEMATICAL MODEL FOR APPROXIMATING TRANSIENT, THREE-DIMENSIONAL GROUNDWATER SYSTEMS,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Lab; and Montana Univ., Missoula.
For primary bibliographic entry see Field 02F.
W71-11359

DETERMINATION OF POLLUTIONAL POTENTIAL OF THE OGALLALA AQUIFER BY SALT WATER INJECTION,
Robert S. Kerr Water Research Center, Ada, Okla.
For primary bibliographic entry see Field 05G.
W71-11361

THE EFFECTIVENESS OF A CONTACT FILTER FOR THE REMOVAL OF IRON FROM GROUND WATER,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05F.
W71-11399

UNSTEADY FLOW TOWARD PARTIALLY PENETRATING ARTESIAN WELLS,
Kentucky Water Resources Inst., Lexington.
Y. H. Huang.
Available from the National Technical Information Service as PB-202 206, $3.00 in paper copy, $0.95 in microfiche. Research Report No. 41, June, 1971, 40 p, 14 fig, 7 ref, append. OWRR Project B-002-KY (2).

Descriptors: *Artesian wells, Computer program, *Drawdown, *Penetration, *Groundwater movement, *Numerical analysis, *Unsteady flow, *Model studies.
Identifiers: Sand models, Axisymmetry, Finite difference, Full penetration, Partial penetration.

A numerical method programmed for a high-speed computer was developed for determining the drawdown around an artesian well. A salient feature of the program is that it can be used for both fully and partially penetrating wells in either infinite or finite aquifers. The method involves the application of finite difference equations to the well-known heat equation using a graded network. A comparison of the finite difference solutions with those obtained from the close-form formulas of Muskat, Theis, and Hantush indicates the validity of the method. A comparison between the finite difference solutions and the drawdowns measured on a sand model, consisting of a circular aquifer 8 feet in diameter and 4 feet thick with a well at the center, shows that the drawdowns in the well are in fairly good agreement, although some discrepancy exists as points outside the well. The discrepancy is believed due to the time lag caused by the use of small tubes as piezometers. If a correction for the time lag is made, the agreement between numerical solutions and experimental measurments is considered satisfactory within the range of experimental errors.
W71-11403

PROCEEDINGS OF GROUNDWATER SYMPOSIUM, AUGUST 28-29, 1969.
New South Wales Univ., Kensington (Australia). Water Research Lab.
For primary bibliographic entry see Field 02F.
W71-11419

4C. Effects on Water of Man's Non-Water Activities

HYDROLOGICAL EFFECTS OF CULTURAL CHANGES AT MOUTERE EXPERIMENTAL BASIN,
Ministry of Works, Nelson (New Zealand). Water and Soil Div.
F. Scarf.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 142-162, 1970. 21 p, 13 fig, 8 tab, 12 ref.

Descriptors: *Land clearing, *Land development, *Stocking, *Clear-cutting, *Soil erosion, Sedimentation, Soil conservation, Data collections, Vegetation effects, Pasture management, Grazing, Water balance, Range management, Hydrographs, Rainfall-runoff relationships, Infiltration.
Identifiers: *New Zealand, *Experimental watersheds.

In the Nelson district, New Zealand, there are approximately 120,000 hectares of Moutere gravel hill country. In the past, frequent burning of gorse and scrub has led to extensive sheet and gully erosion. During land development, cultivated areas are subject to severe rilling, and in some cases, the complete removal of the topsoil. The effects on the hydrological regime resulting from development of small gorse catchments to cultivation and cropping include an increase in annual total runoff, and a decrease in the number of days on which runoff occurred. Individual hydrograph studies indicate increases in runoff up to first peak and peak discharge, and decreases in surface detention and time of overland flow after peak.
W71-11103

PEACE-ATHABASCA DELTA SYMPOSIUM.

Available from University of Alberta, Water Resources Center, Edmonton 7, Alberta, Canada - Price $7.50. Proceedings of the Peace-Athabasca Delta Symposium, January 14-15, 1971, Edmonton, Canada: University of Alberta, Water Resources Center, May 1971. 359 p.

Descriptors: *Conferences, *Deltas, *Hydroelectric power, *Impoundments, *Limnology, *Environmental effects, Economics, Legal aspects, Water levels, Water level fluctuations, Damages, Social aspects, Water law, Water management (Applied), Water resources development.
Identifiers: *Alberta (Canada), *Peace River Delta, Lake Athabasca.

The Peace-Athabasca Delta near Fort Chipewyan, Alberta, Canada, is a unique 2,000 sq mi area of marshes, shallow lakes and winding channels. Since approximately 1966 this delta has been the subject of a growing controversy as biologists began to point out that a large hydroelectric development, the W.A.C. Bennett Dam, under construction in northeastern British Columbia near Hudson Hope, would have detrimental effects on the delta. The objectives of this symposium are: to draw together the results of the large number of studies dealing with the problems of the Peace-Athabasca Delta, and to assemble and bring to public attention all available factual information relevant to the delta problem. The unique ecology of the Peace-Athabasca Delta is the main reason for the widespread concern over possible damages to the area (most of which is included in Wood Buffalo National Park) and secondary damages to the economic base of the settlement of Fort Chipewyan. The water regime is more important to delta ecology than are climatic factors, and the annual spring flooding of the combined deltas serves to maintain the floristic development at a primary successional stage. Without this yearly renewal a mature spruce and muskeg terrestrial community would develop that would be relatively barren of wildlife. (See also W71-11336 thru W71-11339) (Knapp-USGS)
W71-11335

GEOLOGY AND GEOLOGIC HISTORY OF THE PEACE-ATHABASCA DELTA AREA: A SUMMARY,
Research Council of Alberta, Edmonton. Geology Div.
L. A. Bayrock, and J. D. Root.
In: Proceedings of the Peace-Athabasca Delta Symposium, January 14-15, 1971, Edmonton, Canada: University of Alberta, Water Resources Center, p 28-31, May 1971. 4 p.

Descriptors: *Deltas, *Sedimentation, *Lakes, *Suspended load, Bed load, Water levels, Stratigraphy, Regime, Geology.
Identifiers: *Peace River Delta, *Lake Athabasca.

The Peace-Athabasca Delta, located in northeastern Alberta, is one of the largest freshwater inland deltas of the world. In area the delta surface measures 1,475 square miles, comprising the following: Athabasca delta - 760 square miles, Peace delta - 650 square miles, and Birch Delta - 65 square miles. Most of the sediments carried by the Athabasca River are deposited at the delta. The subaqueous portion of the Athabasca Delta near its distributary mouths is composed mainly of silty sand. Silts and clays are deposited farther out in the lake or may be carried to the Slave River through Riviere des Rochers. In contrast, the Peace Delta is made of a much larger portion of silt and clay as most of its bedload is carried downstream. (See also W71-11335) (Knapp-USGS)
W71-11336

LAKE ATHABASCA WATER LEVELS 1930-1970,
Water Survey of Canada, Calgary (Alberta). Alberta and Northwest Territories District Office.
For primary bibliographic entry see Field 02H.
W71-11337

FACTORS CONTROLLING THE LEVEL OF LAKE ATHABASCA,
Research Council of Alberta, Edmonton. Highway and River Engineering Div.
For primary bibliographic entry see Field 02H.
W71-11338

RECENT HYDROLOGIC INVESTIGATIONS IN THE DELTA AND POSSIBLE WATER LEVEL CONTROL MEASURES,
Provincial Dept. of Agriculture, Edmonton (Alberta).. Water Resources Div.
For primary bibliographic entry see Field 02H.
W71-11339

4D. Watershed Protection

INFLUENCE OF MICRORELIEF AND RAVINES ON THE SOIL MOISTURE OF SLOPES (Vliyaniye mikrorel'yefa i ovragov na izmeneniye vlazhnosti pochvy sklonov),
Gidrometeorologicheskii Institut, Odessa (USSR).
For primary bibliographic entry see Field 02G.
W71-11325

MATHEMATICAL SIMULATION OF INFILTRATING WATERSHEDS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 02G.
W71-11348

SEDIMENT IN A MICHIGAN TROUT STREAM--ITS SOURCE, MOVEMENT, AND SOME EFFECTS ON FISH HABITAT,
Forest Service (USDA), Cadillac, Mich. North Central Forest Experiment Station.
For primary bibliographic entry see Field 02J.
W71-11351

CHANGING ATTITUDES TOWARD WATERSHED DEVELOPMENT,
Mississippi State Univ., State College. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W71-11404

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

INCREASED RECOVERY RATE OF SALMONELLAE FROM STREAM BOTTOM SEDIMENTS VERSUS SURFACE WATERS,
Georgia Univ., Athens. Dept. of Microbiology.
Charles W. Hendricks.
Applied Microbiology, Vol 21, No 2, p 379-380, 1971. 1 fig, 1 tab, 9 ref.

Descriptors: *Salmonella, *Streams, *Bottom sediments, Surface waters, Enteric bacteria, Pathogenic bacteria, Shigella, Sampling, Sedimentation, Adsorption, Clays, Sands, Temperature, Coliforms, Growth rates.
Identifiers: North Oconee River (Ga), Salmonella senftenberg, Salmonella enteritidis.

To determine whether recovery yields of pathogenic enteric bacteria may be higher than usually reported for surface waters if river bottom sediments were concomitantly sampled, several locations on the North Oconee River (Clarke County, Georgia) below an unchlorinated, treated sewage outfall were selected for periodic water and bottom sediment collection. The data demonstrate that higher recovery yields of Salmonella can be achieved from bottom sediments than from surface

waters at site C. Of the 195 sediment and river water samples taken over a 1-year period, approximately 90% of the Salmonella species recovered were found in bottom sediments. Possibly sedimentation and adsorption of the organisms to the sands and clays could concentrate bacteria on the bottom. This phenomenon could in itself increase recovery yields of any desired bacterial species, and, if the organism finds suitable nutrients, growth might occur to further increase recovery yields. Eight of the 10 Salmonella were recovered when mid-day water temperatures were above 24 degrees C. Although procedures used were adequate for Shigellae recovery, none could be detected on the primary isolation media. (Jones-Wisconsin)
W71-11004

THE DISTRIBUTION OF THE MAJOR AND SOME MINOR ELEMENTS IN MARINE ANIMALS. I. ECHINODERMS AND COELENTERATES,
Liverpool Univ. (England).
J. P. Riley, and D. A. Segar.
Journal of the Marine Biological Association of the United Kingdom, Vol 50, p 721-730, 1970. 4 tab, 13 ref.

Descriptors: *Metals, *Heavy metals, *Trace elements, *Elements (Chemical), *Analytical techniques, *Spectrophotometry, *Flame photometry, *Colorimetry, Aluminum, Calcium, Cobalt, Chromium, Copper, Iron, Potassium, Magnesium, Manganese, Sodium, Phosphorous, Absorption.
Identifiers: *Bioconcentration, *Echinodermata, *Coelenterata, *Elemental distribution, Silver, Cadmium, Nickle, Lead, Tin, Strontium, Zinc.

A scheme employing atomic absorption spectrophotometry, flame photometry and colorimetry has been developed for the determination of Ag, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, P, Pb, Sn, Sr and Zn in marine animals. The distribution of these elements in 7 echinoderms and 2 coelenterates has been studied. Tables are presented for their concentrations in the dissected parts of the echinoderms, Echinus esculentus, Spatangus purpureus and Asterias rubens. Trace metals are most strongly concentrated in the digestive parts of the organisms, less so in the gonads, and least in the skeletal tissues. Of these metals zinc attains the highest concentration, in some instances copper, nickle and cadmium are also quite strongly concentrated. (LeGore-Washington)
W71-11046

A WATER HARDENER FOR EXPERIMENTAL USE,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 09C.
W71-11047

SALMONELLA INFANTIS IN CATTLE FEEDLOT RUNOFF,
Kansas State Univ., Manhattan. Dept. of Bacteriology.
J. R. Miner, L. R. Fina, and Cheryl Platt.
Applied Microbiology, Vol. 15, No. 3, May 1967, p 627-628, 1 tab, 10 ref.

Descriptors: *Farm wastes, *Runoff, *Pathogenic bacteria, Microorganisms, Cattle, Salmonella, Pollutant identification.
Identifiers: *Feedlot runoff, *Salmonella infantis, Litter.

Ten isolates of Salmonella infantis (serologically typed) were found in litter and runoff collected from two experimental feedlots near the Kansas State University campus. Pathogenic implications are discussed relative to recreation water sites. Agricultural runoff maybe a source of viable salmonellae. (Christenbury-ISU)
W71-11051

ISOLATION OF GRANULOSIS VIRUS FROM HELIOTHIS ARMIGERA AND ITS PERISTENCE IN ABIAN FECES,
Cape Town Univ., (South Africa). M. R. C. Virus Research Unit.
Hela Gitay, and A. Polson.
Journal of Invertebrate Pathology, Vol. 17, No. 2, p 288-290, 1971. 4 fig.

Descriptors: *Viruses, *Isolation, Farm wastes, Birds, Laboratory tests.
Identifiers: *Cattle egret, Procedure, Feeding habits.

This paper describes the procedures by which a granulosis virus was isolated. Feces of the Cattle egret, Arboela ibis, that feed on the caterpillars of the bollworm and the lucerne caterpillar were collected and found to contain intact inclusion bodies of granulosis virus but no polyhedra. The granulosis virus was isolated from the bollworm caterpillars, Heliothis armigera. (Christenbury-ISU)
W71-11058

MERCURY IN WATER OF THE TIDAL THAMES,
Institute of Geological Sciences, London (England). Geochemical Div.
J. David Smith, R. A. Nicholson, and P. J. Moore.
Nature, Vol 232, No 5310, p 393-394, August 6, 1971. 2 p, 1 tab, 8 ref.

Descriptors: *Water pollution sources, *Heavy metals, *Analytical techniques, Estuaries, Chemical wastes, Rivers.
Identifiers: *Mercury, *Water pollution (Mercury), Thames River (England).

A method for the determination of traces of mercury is applied to the tidal reaches of the River Thames (England). This study indicates that 82-97% of the mercury in tidal waters of the Thames is held on suspended particulate matter and that significant amounts of mercury are introduced in sewage effluent. Among aquatic organisms, filter feeders such as molluscs and tunicates are especially exposed to mercury in the particulate form, but as dissolved mercury is readily adsorbed onto particulate matter, the effects of mercury on photosynthesis and productivity of phytoplankton may be more important. (Woodard-USGS)
W71-11083

SAMPLING AND MEASUREMENT IN THE AQUATIC ENVIRONMENT,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
Surinder K. Bhagat, Donald E. Proctor, and William H. Funk.
Water and Sewage Works, Vol 118, No 6, p 180-187, June 1971. 8 p, 12 fig, 1 tab, 14 ref. EPA. Contract No 16080.

Descriptors: *Water pollution sources, *Water quality, *Water pollution effects, *Water pollution control, Data collections, Water chemistry, Chemical analysis, Lakes, Streams, Washington, Oregon, Ecology.
Identifiers: *Vancouver Lake (Wash).

This report is largely based on our water quality studies of Vancouver Lake, which in its present condition is polluted and therefore, is of very little value to the nearby communities of Vancouver, Wash., and Portland, Ore. However, this inland body of water, with approximately four sq mi (2620 acres) of surface area, has a potential of becoming a useful multi-purpose resource. The Vancouver Lake studies are related to the determination of present water quality conditions, evaluation of the sources of pollution and the exploration of ways to improve the usefulness of this resource.
W71-11084

GENERAL WATER QUALITY CRITERIA AND SPECIFIC WATER QUALITY STANDARDS.
Maryland Water Resources Commission, Annapolis, Md.; and Maryland Dept. of Water Resources, Annapolis.
For primary bibliographic entry see Field 06E.
W71-11165

GROUND-WATER QUALITY AND STRUCTURAL CONTROL IN SOUTHEASTERN VIRGINIA,
Marshall Univ., Huntington, W. Va. Dept. of Geology; and Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 02F.
W71-11205

STANDARDIZED WATER ANALYSES AND THEIR APPLICATION TO RIVER SURVEYS IN NATAL,
National Inst. for Water Research, Durban (South Africa). Natal Regional Lab.
P. H. Kemp.
Water Research, Vol 5, No 6, p 291-295, June 1971. 5 p, 2 fig, 3 tab, 7 ref.

Descriptors: *Water analysis, *Aqueous solutions, *Water chemistry, Chemical analysis, Data collections, Calcium, Magnesium, Sodium, Potassium, Carbonates, Sulfates, Chlorides, Water quality.
Identifiers: *South Africa, *Total dissolved solids.

During investigations of the rivers of Natal, South Africa, the following procedure has been developed for the standardization of water analyses. The concentrations of the major ionic soluted are determined by analysis. These include calcium, magnesium, sodium, potassium, carbonate (or bicarbonate), sulfate and chloride. Silica are excluded since it normally occurs in non-ionic form. A conventional 'carbonate' concentration is calculated as 0.6 times the total alkalinity of CaCO3 or from the bicarbonate and carbonate ion concentrations. The total of these concentrations is found (using the conventional carbonate concentration in place of those of carbonate and bicarbonate ions) and each is finally expressed as a percentage of that total. In effect, this procedure expresses each major ionic solute as a percentage of the calculated TDS, the use of the experimental TDS determined gravimetrically being avoided because its experimental error is usually too great. By means of this procedure the effects of simple dilution or concentration upon the analysis of the water are eliminated and the analyses of different water samples become directly comparable. (Knapp-USGS)
W71-11211

CHEMISTRY OF NATURAL WATERS--1. FUNDAMENTAL RELATIONSHIPS,
National Inst. for Water Research, Durban (South Africa). Natal Regional Lab.
For primary bibliographic entry see Field 02K.
W71-11212

TECHNIQUES FOR QUALITY-OF-WATER INTERPRETATIONS FROM CALIBRATED GEOPHYSICAL LOGS, ATLANTIC COASTAL AREA,
Geological Survey, Norfolk, Va. Water Resources Div.
For primary bibliographic entry see Field 02F.
W71-11218

POLLUTION DETECTION BY REMOTE SENSING,
American Chemical Society, Washington, D.C.
H. Martin Malin, Jr.
Environmental Science and Technology, Vol 5, No 8, p 676-677, August 1971. 2 p.

Descriptors: *Water pollution, *Remote sensing, *Ecology, *Satellites (Artificial), *Earth (Planet),

Data collections, Hydrologic data, Water pollution sources, Water pollution effects, Water pollution control, Instrumentation, Methodology, Pollutant identification.
Identifiers: *Environmental pollution, *Remote sensing (NASA-USGS).

Of critical importance is a global monitoring system--a data-gathering network that will provide a base from which to assess the effects of changing pollutant concentrations, climatological patterns, and demographic shifts on the environment. The Aeronautics and Space Administration (NASA) and the U.S. Geological Survey (USGS) are collaborating on a limited-scale remote sensing venture called CARETS (Central Atlantic Regional Ecological Test Site). Early next year, NASA plans to launch its Earth Resources Technology Satellite (ERTS) for the collection of remote data on a much larger scale. Then, in 1973, Skylab will provide additional data, perhaps on a global basis. Ultimately, the data will be fed into the Department of Interior's Earth Resources Observation System (EROS) which is administered by USGS; the EROS data center is located at Sioux Falls, S.D. (Woodard-USGS)
W71-11220

ORGANIC MATTER IN NATURAL WATERS--A SYMPOSIUM.
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05B.
W71-11226

LIPIDS OF MARINE WATERS,
Texas A and M Univ., College Station. Dept. of Oceanography.
Lela M. Jeffrey.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 55-76, June 1970. 22 p, 8 tab, 30 ref.

Descriptors: *Organic matter, *Sea water, *Surveys, *Lipids, *Organic compounds, Water chemistry, Plankton, Oil wastes, Water analysis, Solvent extractions.
Identifiers: *Chloroform-extractable organic matter.

The concentration of chloroform-extractable soluble organic compounds (lipids) in Gulf of Mexico waters ranges from 0.95 mg C/liter in shallow, highly productive Baffin Bay to 0.09 mg C/liter in subsurface waters of the western and southern Gulf. Chloroform extracts from these semitropical waters contain 10 to 20% of the total dissolved organic carbon. Lipids of Antarctic oceanic waters constitute 40 to 55% of the total dissolved organic carbon, and the lipid concentrations are double those in the Gulf of Mexico. This may be related to the higher productivity of the Antarctic and to the fact that Antarctic plankton contain much higher percentages of lipids than do Gulf of Mexico plankton. Delta C-13 values for oceanic Gulf of Mexico chloroform extracts range from -28.0 per mil in surface water to -25.1 per mil (relative to the Chicago PDB standard) at 2000 m. The water lipids apparently are less enriched in C-13 than most of the other soluble organic carbon In sea water, but have approximately the same C-13/C-12 ratio as do the lipids of the plankton. The various compounds identified in lipid solvent extracts of slicks, surface water, anoxic waters, and coastal and oceanic waters are reviewed. (See also W71-11226) (Knapp-USGS)
W71-11228

MOLECULAR NATURE OF NITROGENOUS COMPOUNDS IN SEA WATER AND RECENT MARINE SEDIMENTS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 05B.
W71-11229

DISSOLVED AND PARTICULATE CARBOHYDRATES,
Nagoya Univ. (Japan). Water Research Lab.
Nobuhiko Handa.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 129-152, June 1970. 24 p, 7 fig, 3 tab, 40 ref.

Descriptors: *Organic matter, *Sea water, *Biochemistry, *Carbohydrates, Distribution patterns, Nutrients, Carbon, Nitrogen, Aqueous solutions, Suspended load, Sampling.
Identifiers: *Japan.

Detailed profiles of dissolved carbohydrate and particulate organic carbon, organic nitrogen, carbohydrate and amino acid from sea water and from particulate samples from various depths at a station off Honsyu, Japan are presented. Dissolved carbohydrate is distributed uniformly from the surface to 1000 m. Values range from 0.24 to 0.37 mg/liter glucose. Carbohydrate probably decomposes more rapidly than proteins and amino acids in the euphotic zone. The reverse is true in deep water, so C/N ratios for particulate matter increase with depth. Acid hydrolysis of the particulate matter yielded D-galactose, D-glucose, D-mannose, D-xylose and D-glucuronic acid. The water soluble fraction consists of 1,3-glucan and related low molecular weight carbohydrates. These must polymerize between 50 and 300 m resulting in water insoluble carbohydrates resistant to biological attack. (See also W71-11226) (Knapp-USGS)
W71-11230

DISSOLVED ORGANIC COMPOUNDS IN SEA WATER: SATURATED AND OLEFINIC HYDROCARBONS AND SINGLY BRANCHED FATTY ACIDS,
Woods Hole Oceanographic Institution, Mass.
M. Blumer.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 153-167, June 1970. 15 p, 3 tab, 19 ref. ONR N0014-66-Contract CO-241; NSF Grants GA-539 and GA-1625; API Grant 85A.

Descriptors: *Path of pollutants, *Organic matter, *Lipids, *Organic acids, *Tracers, *Pollutant identification, Chromatography, Biochemistry, Analytical techniques, Water analysis, Oily water, Nutrients, Water chemistry.
Identifiers: *Hydrocarbons.

Organic compounds are introduced into the sea from many sources. Each source contributes a characteristic pattern of compounds differing in relative concentrations, molecular weight and type distributions. From a quantitative analysis of the organic compounds in sea water it is possible to estimate the relative environmental contributions to different water masses. The characteristic relative concentrations and molecular weight distribution patterns within each group of dissolved organic compounds permit correlating them with specific sources. In contrast to the diffuse picture derived from bulk measurements such as that of the total dissolved organic content, the analysis of the molecular composition of sea water promises to become a sensitive tool for the study of marine processes. Even at the present qualitative stage of investigation, every class of compounds is so closely associated with a specific source, and will be so severely altered in its relative composition by contributions from other sources, that the usefulness of organic compounds as marine environmental tracers is readily apparent. (See also W71-11226) (Knapp-USGS)
W71-11231

VOLATILE ORGANIC MATERIALS IN SEA WATER,
Antioch College, Yellow Springs, Ohio.
James F. Corwin.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 169-180, June 1970. 12 p, 3 fig, 3 tab, 14 ref.

Descriptors: *Organic matter, *Sea water, *Water analysis, *Chromatography, Chemical analysis, Adsorption, Colorimetry, Alcohols, Water pollution sources, Pollutant identification, Reviews.
Identifiers: *Volatile organic matter.

A review of the literature concerning the presence of dissolved organic materials in the ocean is coupled with a discussion of the development of methods to assay the organic content. Attention is called to procedures that eliminate or destroy the volatile material. Methods for determining the volatile organic content of sea water are reviewed and a new method for determination of low molecular weight oxygen containing organic compounds is reported along with results obtained for sea water. Suggested work could result in a complete method for volatile organics. (See also W71-11226) (Knapp-USGS)
W71-11232

CHEMICAL STRUCTURES OF COLOR PRODUCING ORGANIC SUBSTANCES IN WATER,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. F. Christman.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 181-198, June 1970. 18 p, 5 fig, 3 tab, 8 ref.

Descriptors: *Humic acids, *Organic matter, *Color, *Phenols, *Surface waters, Biochemistry, Water analysis, Water chemistry, Analytical techniques, Chemical analysis, Biological properties, Sampling, Chromatography, Oxidation, Lipids, Organic acids.
Identifiers: Water color.

The general physical and gross chemical properties of the natural product organic material responsible for the yellow color of fresh water are reviewed. These materials are often referred to as 'fulvic acids', which implies their complex, polyphenolic nature and their relation to soil or sedimentary organic matter. Estimates of the molecular weights of these acids have varied from 180 to 10,000. An extensive association with iron appears to be a general property. Recent research efforts are on the development of mild degradative techniques for color-producing substances isolated from natural waters so that the relation of color to environmental soil and vegetative conditions as well as the significance of these organics to the aqueous biologic community may be better understood. (See also W71-11226) (Knapp-USGS)
W71-11233

DETERMINATION OF MICROBIAL BIOMASS IN DEEP OCEAN WATER,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
Osmund Holm-Hansen.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 287-300, June 1970. 14 p, 5 fig, 17 ref. USAEC Contract AT (11-1)GEN 10, PA 20.

Descriptors: *Biomass, *Organic matter, *Sea water, Water analysis, Algae, Chemical analysis, Sampling, Analytical techniques, Nutrients, Food chains, Bioluminescence, Pollutant identification.
Identifiers: *ATP analysis, *Adenosine triphosphate.

The content of ATP in the particulate fraction was determined in four profiles in the Pacific Ocean

down to 3500 m. The ATP values were converted to cellular organic carbon values and compared to the total organic carbon in the particulate fraction. The microbial biomass as estimated by the ATP data is very high in the euphotic zone and decreases rapidly to 1 to 2 micrograms of cellular C/liter at about 200 m. At the lower depths sampled, the calculated biomass contained about 0.1 microgram of organic C/liter. Microscopic examination of deep samples showed the presence of large numbers of small flagellated algal-like cells. (See also W71-11226) (Knapp-USGS)
W71-11234

INSTRUMENTAL TECHNIQUES FOR THE IDENTIFICATION OF POLLUTANTS,
Rocketdyne, Canoga Park, Calif. Environmental Sciences and Technology.
Ihor Lysyj.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 333-349, June 1970. 18 p, 6 fig, 2 tab, 2 ref. OSW Contract 14-01-0001-965.

Descriptors: *Water analysis, *Pollutant identification, *Gas chromatography, *Path of pollutants, Mathematical studies, Water analysis, Analytical techniques, Tracers, Tracking techniques, Spectroscopy.
Identifiers: *Pyrolysis, Mass spectroscopy.

A pyrographic method for analysis and identification of water pollutants consists of (1) direct pyrolysis of water samples containing organic pollutants, (2) gas chromatographic separation and hydrogen flame ionization measurement of pyrolytic fragments produced and (3) application of mathematical techniques for the interpretation of resulting complex pyrograms. No sample preconcentration or preanalysis handling is required. The technique has potential application in rapid tracing of pollutants to their sources, ascertaining the pollution load contributed by each upstream source, and measuring the degradation rates of pollution during downstream travel. (See also W71-11226) (Knapp-USGS)
W71-11237

IDENTIFICATION OF ORGANIC MATTER IN POLLUTED WATER,
Federal Water Pollution Control Administration, Cincinnati, Ohio. Water Research Lab.
A. A. Rosen.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 359-367, June 1970. 9 p, 17 ref.

Descriptors: *Pollutant identification, *Organic compounds, *Chemical wastes, *Analytical techniques, Water pollution sources, Dissolved oxygen, Poisons, Gas chromatography, Spectrophotometry, Sampling, Solvent extractions.
Identifiers: Organic chemical analysis.

Organic chemical pollutants have to be identified when they exert specific adverse effects on water quality beyond the consumption of dissolved oxygen. Pollutants of this class may affect human physiology, aquatic life, industrial applications, and esthetic and recreational uses. The proportion of industrial wastes in waterborne organic matter is determined by carbon isotope assay. A general analytical system starts with the recovery of organic matter from large volumes of polluted water. The available wide array of organic analytical methods, most of which are suitable only for isolated substances in a non-aqueous environment, can then be applied to the recovered organics. Isolation of individual pollutants makes use of solubility group separations, adsorption chromatography and specific separation techniques. The most rewarding of these have proved to be the many variants of gas chromatography and spectrophotometry. When the pollutants have been identified, it is important to correlate them with the adverse effects observed in the original water sample. (See also W71-11226) (Knapp-USGS)
W71-11239

LOW MOLECULAR WEIGHT HYDROCARBONS AND CARBON MONOXIDE IN SEA WATER,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11244

ORGANIC CHEMISTRY OF NATURAL SEA SURFACE FILMS,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11245

MICRODETERMINATION OF URONIC ACIDS AND RELATED COMPOUNDS IN THE MARINE ENVIRONMENT,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
P. M. Williams, and J. S. Craigie.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 509-519, June 1970. 11 p, 3 fig, 2 tab, 15 ref. USAEC Contract AT (11-1) GEN 10, PA 20.

Descriptors: *Chemical analysis, *Bottom sediments, *Plankton, *Sea water, *Organic acids, Colorimetry, Pollutant identification.
Identifiers: *Uronic acids.

A determination of uronic acids on the microgram level was developed by modification of the classical acidic decarboxylation procedure of Lefevre and Tollens. Using this method, the presence of uronic acids or related compounds has been established in five species of phytoplankters and in the particulate organic detritus in the sea. (See also W71-11226) (Knapp-USGS)
W71-11248

WHAT YOU DON'T KNOW CAN HURT YOU: ORGANIC COLLOIDS AND NATURAL WATERS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11249

STUDY TO EVALUATE THE UTILITY OF AERIAL SURVEILLANCE METHODS IN WATER QUALITY MONITORING,
North American Rockwell, El Segundo, Calif. Space Div.
P. B. Chandler, W. L. Dowdy, and D. T. Hodder.
California Water Resources Control Board Publication No 41, September 1970. 100 p, 33 fig, 7 tab, 21 ref, 9 append. Contract 9-2-42 Calif. Water Resources Control Bd.

Descriptors: *Remote sensing, *Pollutant identification, *Aerial photography, *Infrared radiation, *Solar radiation, Water pollution, Path of pollutants, Spectroscopy, Photometry, Surveys, California, Monitoring.
Identifiers: *Water pollution monitoring.

A pilot project was initiated to demonstrate the utility of aerial surveillance techniques in water quality management as inventory, monitoring, and enforcement tools. Emphasis was placed primarily on determining those water quality factors amenable to measurement by remote sensing techniques and the most desirable methods of obtaining useful water quality measurements. In satisfying this objective, a survey of research and operational aerial surveillance programs was conducted and summarized, and a limited-scale aerial surveillance/seatruth demonstration of selected water quality factors conducted. Operational oil spill detection is possible with thermal infrared radiometer and scanner imagery, ultraviolet imagery, various frequencies of microwave radiometers, and aerial photography. Surficial thermal anomalies of as low as 0.5 deg C can be detected operationally with thermal infrared radiometers and scanners. Algae blooms can be detected in clear water with color infrared. Turbidity is directly detectable. Shoreline development facilities which contribute to degraded water quality can be detected. (Knapp-USGS)
W71-11250

DETERMINATION OF RADIUM-228 IN NATURAL WATERS,
Geological Survey, Washington, D.C.
Jesse O. Johnson.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402--Price 25 cents. Geological Survey Water-Supply Paper 1696-G, 1971. 26 p, 2 fig, 3 tab, 30 ref.

Descriptors: *Radium radioisotopes, *Water analysis, *Radiochemical analysis, Radioactivity techniques, Radioisotopes, Chemical analysis, Analytical techniques, Laboratory tests, Water chemistry, Pollutant identification.
Identifiers: Radium analysis.

Radium isotopes are important radioactive constituents of most natural waters, although they are present in extremely minute quantities. A method is presented for determining the beta-active isotope radium-228; extensions of the method for determining the alpha-emitting radium isotopes are discussed. Radium-228 is determined by coprecipitating the radium isotopes with barium and lead sulfates. The sulfate precipitates are then dissolved in alkaline EDTA after washing with concentrated nitric acid. Barium and radium sulfates are then precipitated, redissolved, then reprecipitated using strontium and yttrium as 'hold-back' carriers. The barium sulfate precipitate is again dissolved in alkaline EDTA. Lead and yttrium carriers are added to the solution, which is aged for 36 hours or longer. Ammonium sulfide is then added to the solution to precipitate lead sulfide, and excess sodium hydroxide is added to precipitate yttrium hydroxide. Radium-228 is determined by beta counting the yttrium hydroxide precipitate, which contains the actinium-228, daughter of radium-228. (Knapp-USGS)
W71-11252

WATER RESOURCES DATA FOR KANSAS, PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 07C.
W71-11265

POTENTIAL APPLICATION OF AN INFRARED SPECTRORADIOMETER FOR REMOTE DETECTION AND IDENTIFICATION OF OIL SLICKS ON WATER,
Gulf General Atomic Co., San Diego, Calif.; and Cincinnati Univ., Ohio. Dept. of Chemistry; and Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.; and Aerospace America, Inc., Bay City, Mich.
James S. Mattson, Harry B. Mark, Jr., Arnold Prostak, and Clarence E. Schutt.
Environmental Science and Technology, Vol 5, No 5, May, 1971, p 415-420, 10 fig, 1 tab, 3 ref.

Descriptors: *Oily water, *Remote sensing, *Monitoring, *oil wastes, Water pollution sources, Sea water, Spectrometers, Infrared radiation, Model studies.
Identifiers: Infrared spectroradiometer.

The problem of detecting and identifying the origin of oil slicks in real-time might be solved by the development of a remote monitoring system. Simulation experiments were made to record external reflectance infrared spectra of thin organic films on

water, with a chopped infrared spectroradiometer as the receiver. The Bendix spectroradiometer had a circular variable interference filter as a monochromator and a small computer for instrument control and preliminary data reduction. A modulated source was used for these experiments, and the floating organic films used were styrene and oleic acid, compounds which exhibit distinctive spectra in the 8.5 to 12.5- range of the instrument that was available. The technique could be expanded to cover the entire spectrum, as would be required in real-time oil-slick monitoring. As many as 40 spectra at an angle of incidence of about 30 degrees were obtained on the various samples, and these spectra were later averaged channel by channel. The continuously varying thicknesses of the film are not a problem providing averages are made over a sufficiently long period of time. There are definite possibilities of adapting this technique to the actual remote monitoring of oil films on water. (Smith-PAI)
W71-11288

INPUT OF POLYCHLORINATED BIPHENYLS INTO CALIFORNIA COASTAL WATERS FROM URBAN SEWAGE OUTFALLS,
California Univ., Berkeley. Marine Resources Inst.
For primary bibliographic entry see Field 05B.
W71-11290

A SAMPLER FOR CONCENTRATING RADIONUCLIDES FROM NATURAL WATERS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
W. B. Silker, R. W. Perkins, and H. G. Rieck.
Ocean Engineering, Vol 2, No 2, April 1971, p 49-55, 4 fig, 2 tab, 12 ref.

Descriptors: *Sampling, *Sea water, *Fresh water, *Radioisotopes, Filtration, Sorption, Ion exchange, Flow rates, Radioactivity, Water quality, *Pollutant identification.

The measurement of radionuclides occurring in large volumes of ocean and freshwater can provide much information about dynamic processes but is difficult because of the very low concentrations. The Battelle Large Volume Water Sampler has been constructed mainly of polyvinyl chloride and the water sample passes through a filtration section for particule removal, then through a sorption section where the radionuclides of interest are removed on sorption or ion exchange beds. Aluminum oxide was used as the sorption material as it is efficient for a wide spectrum of radionuclides, and flow rates of about 40.1./min were employed. A BLVS and auxiliary equipment are shown in shipboard operation. A vertical sampling line is maintained by weighting with a 100 lb. lead weight, to provide an accurate record of the depth of the sample. Good agreement was obtained between laboratory and in situ ocean measurements of the retention efficiency of all the radioisotopes. The sampler was used successfully for concentrating some twenty radionuclides from ocean and fresh waters. It can be adapted to allow addition or subtraction of filter units, addition of sorption beds, and can be used in cramped and remote field collection sites. (Smith-PAI)
W71-11295

WATER COMPOSITION CONTROLS BY CLAY MINERALS,
Washington State Water Research Center, Pullman.
For primary bibliographic entry see Field 02G.
W71-11300

HOW GOOD ARE ANALYSES OF OILS BY GLC (gas liquid chromatography),
Department of Agriculture, Philadelphia, Pa. Eastern Utilization Research and Development Div.
For primary bibliographic entry see Field 07C.
W71-11301

X-RAY FLUORESCENCE ANALYSIS OF ADDITIVES AND CONTAMINANTS IN LUBRICATING OILS AND OTHER HYDROCARBONS - MATRIX ERROR CORRECTION METHOD,
Shell Research Ltd., Chester (England). Thornton Research Centre.
R. J. Bird, and R. W. Toft.
Journal of the Institute of Petroleum, Vol 56, No 550, p 169-177, July 1970. 3 fig, 5 tab, 9 ref.

Descriptors: *X-Ray fluorescence, *Oils, *Sulphur, *Computers, Calcium, Phosphorus, Chlorine, Carbon, Lead, Copper, Iron, Oil wastes, Spectroscopy, Statistical methods.
Identifiers: *Oil additive, Barium, Zinc, Transmission fluid, Motor oil, Industrial oil, Bromine.

This x-ray fluorescence method involves the total analysis of the sample and the correction of the observed x-ray intensities mainly for absorption losses. The raw data, with up to 10 specific elements and with variations in carbon/hydrogen ratio, are processed by computer. The major disadvantage of this approach is the labor involved in determining accurate values for the analysis of complex mixtures of elements, such as used lubricating oils. Good agreement is obtained with chemical results in a total analysis time which is typically about one hour per sample containing six elements. (McCann-Battelle)
W71-11302

LUBRICATING OIL QUALITY CONTROL FOR SMALL BLENDING PLANTS - DETERMINATION OF METALS BY COMPLEXOMETRIC TITRATION,
Shell Research Ltd., Chester (England).
G. B. Crump, and J. W. Noar.
Journal of the Institute of Petroleum, Vol 56, No 550, p 180-186, July 1970. 2 tab, 4 ref.

Descriptors: *Oil industry, *Volumetric analysis, *Oil, Aqueous solutions, Pollutant identification.
Identifiers: *Complexometric titration, *Lead, *Zinc, Barium.

Complexometric titration is considered as a blend control method for small blending plants which provide finished lubricating oils for smaller countries. There are two methods of applying complexometric techniques: in one the metals are extracted from the oil by aqueous solution prior to titration; in the other the metals are titrated directly. The development, testing, and application of these methods can now be regarded overall as a successful exercise, however, they are not perfect and like all methods must be under constant review. (McCann-Battellee)
W71-11303

GROWTH OF SALMONELLA AT LOW pH,
Wisconsin Univ., Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 05C.
W71-11305

LABORATORY STUDIES WITH A SELECTIVE ENTEROCOCCUS MEDIUM,
Long Island Jewish Medical Hospital, New Hyde Park, N.Y.
Henry D. Isenberg, Dorothy Goldberg and Jane Sampson.
Applied Microbiology, Vol 20, No 3, p 433-436, September 1970. 1 fig, 2 ref.

Descriptors: *Streptococcus, *Cultures, *Pollutant identification, Enteric bacteria, Infection, E. coli, Bioindicators, Biochemistry, Human diseases, Public health.
Identifiers: Enterococcus, Agar, Listeria monocytogenes, Clinical microbiology, Streptococcus faecalis, Streptococcus faecalis var. liquefaciens, Streptococcus faecalis var zymogenes, Streptococcus faecium, Streptococcus faecium var casseliflavus, Streptococcus equinus, Shigella sp., Salmonella sp., Pseudomonas aeruginosa, Pseudomonas stutzeri, Pseudomonas putida, Pseudomonas maltophilia, Pseudomonas alcaligenes, Pseudomonas pseudomallei, Serratia marcescens, Flavobacterium sp., Klebsiella sp., Proteus morgani, Proteus mirabilis, Achromobacter sp., Aeromonas hydrophilia, Alcaligenes faecalis, Alcaligenes odorans, Staphylococcus aureus, Staphylococcus epidermidis, Sarcina lutea, Streptococcus pyogenes, Streptococcus pneumoniae, Streptococcus salivarius, Streptococcus mitis, Neisseria sp., Corynebacterium sp., Candida albicans.

Lancefield group D streptococci are involved with appreciable frequency in a variety of infectious processes. The presumptive recognition of these bacteria on initial culturing of clinical specimens is an objective not attained readily by selective media available in the clinical laboratory. Selective Enterococcus agar was evaluated with emphasis on its ability to sequester enterococci from specimens with many microbial components. In addition, the sensitivity of this new agar was compared with Trypticase Soy agar containing sheep blood and Mitis Salivarius agar. All enterococci isolated fromclinical material were classified in accordance with accepted biochemical and immunochemical criteria. Besides 250 group D streptococci, 8 strains representing the following species were tested: S. faecalis S. faecalis var. liquefaciens, S. faecalis var. zymogenes, S. faecium, S. faecium var. casseliflavus (1), and an organism with the biochemical and physiological characteristics of S. equinus. The enterococci grew on the new medium as distinctive colonies surrounded by a black zone. Only Listeria monocytogenes presented similar colonial morphology after 48 hr. Most other bacteria did not grow at all or appeared markedly different. The sensitivity of the new agar was of the same order of magnitude as on blood or Mitis-Salivarius agars, but its selectivity was superior. (Mortland-Battelle)
W71-11306

IDENTIFICATION OF ENTEROBACTERIACEAE IN THE CLINICAL MICROBIOLOGY LABORATORY,
Bowman Gray School of Medicine, Winston-Salem, N.C. Dept. of Microbiology; and Bowman Gray School of Medicine, Winston-Salem, N.C. Dept. of Pathology.
Walter H. Traub, Ella A. Raymond, and Josephine Linehan.
Applied Microbiology, Vol 20, No 3, p 303-308, September 1970. 5 tab, 41 ref.

Descriptors: *E. coli, *Salmonella, *Bioindicators, *Cultures, Fermentation, Pollutant identification, Biochemistry, Arizona, Pollutant identification.
Identifiers: *Agars, Lactose fermenting, Enterobacteriaceae, Proteeae, Shigella, Enterobacter cloacae, Citrobacter freundii, Klebsielleae pneumoniae, Enterobacter aerogenes, Enterobacter liquefaciens, Enterobacter hafniae, Pectobacterium, Salmonella marcescens, Proteus mirabilis, Proteus morganii, Proteus rettgeri, Providencia stuartii, Providencia alcalifaciens, Klebsielleae ozaenae, Edwardsiella tarda.

Data obtained with different batteries of biochemical tests were analyzed to determine their reliability and accuracy with regard to the identificat of lactose-fermenting (LP) and nonfermenting (NLF) enterobacterial isolates within 24 hours after isolation. A total of 5,137 isolates were examined with three series of biochemical tests. The data indicated that the tests employed for NLF isolates were adequate for the majority of isolated Enterobacteriaceae, with the exception of Pectobacterium. It is planned to substitute rhamnose for arabinose, to facilitate the differentiation between E. cloacae and E. liquefaciens. Examination of the data obtained for LF indicated that inositol is unnecessary, as are the MR and Voges-Proskauer (VP) tests. A total of 1,453 isolates of E. Coli, including anaerogenic biotynes, were encountered, of which 75 percent fermented lactose. (Mortland-Battelle)
W71-11307

TRACE ANALYSIS OF PESTICIDES USING CHOLINESTERASE FROM HUMAN SERUM, RAT LIVER, ELECTRIC EEL, BEAN LEAF BEETLE, AND WHITE FRINGE BEETLE,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
M. H. Sadar, S. S. Kuan, and G. G. Guilbault.
Analytical Chemistry, Vol 42, No 14, p 1770-1774, December 1970. 5 fig, 3 tab, 16 ref.

Descriptors: *Pesticides, *Organophosphorus pesticides, *Analytical techniques, *Fluorometry, Enzymes, Eel, Assay, Animal physiology, Toxicity, Aldrin, Dieldrin, Heptachlor, DDT, Pollutant identification.
Identifiers: Beetles, Cholinesterase, Parathion, Methyl parathion, Paraoxon, DDVP, Chemical interference, Rat liver, Human serum, Sevin, Methoxychlor, Mirex, Lindane.

A fluorometric method was developed for the determination of organophosphorus and chlorinated pesticides. Advantage was taken of the fact that cholinesterases extracted from five different sources respond differently to various pesticides. Cholinesterase from rat liver and human serum is strongly inhibited by organophosphorus compounds but the chlorinated pesticides have no effect. The enzyme from electric eel is sensitive to chlorinated pesticides only. Cholinesterases from both the bean leaf beetle and white fringe beetle are very strongly inhibited by Paraoxon and DDVP, but Parathion and methyl parathion are very weak inhibitors. There is no interference either from the chlorinated or carbamate pesticides. The substrate N-methyl indoxyl acetate is cleaved by all five different cholinesterases to the highly fluorescent N-methyl iodoxyl. The various pesticides, when introduced into the reaction system, inhibit the hydrolysis of the substrate catalyzed by cholinesterase causing a decrease in the initial slopes of the fluorescence-time curve, delta F/min. This decrease is a direct measure of the concentration of the inhibitor present. From the results of this study, it can be concluded that in addition to sensitivity, some specificity in the assay of pesticides using enzymic methods has been achieved. (Mortland-Battelle)
W71-11308

ECOLOGY OF THE ALGAE OF A FLORIDA KEY. I. A PRELIMINARY CHECKLIST, ZONATION, AND SEASONALITY,
South Florida Univ., Tampa. University of South Florida, Tampa.
For primary bibliographic entry see Field 05C.
W71-11309

IMAGING TECHNIQUES FOR OIL POLLUTION SURVEY PURPOSES,
Earth Satellite Corp., Washington, D.C., Geosciences and Environmental Applications.
Frank J. Wobber.
Photographic Application in Science, Technology and Medicine, Vol 6, No 4, p 16-23, July 1971. 8 p, 10 fig, 1 tab, 13 ref.

Descriptors: *Oily water, *Pollutant identification, *Remote sensing, Infrared radiation, Ultraviolet radiation, Aerial photography, Solar radiation, Radar, Oil fields, Sea water, Monitoring.
Identifiers: *Oil spills, Oil spill detection.

The application of remote sensing, particularly imaging, for onshore and offshore oil pollution control purposes is briefly reviewed. Limited quantities of imagery are available to assess onshore spills, but a historical base to project operational applications is nonexistent. Helicopter platforms should provide the most effective scanning tool in urban areas or in the vicinity of oil refineries and storage facilities. Ultraviolet combined with thermal infrared imagery can best be used for oil slick detection in the marine environment. Thermal infrared imagery and multiband photography can, with further research and development, permit volumetric estimates of spills. Low altitude color photography and thermal imagery are promising. Ultraviolet photography and panchromatic photography with selected filtration, color and color infrared photography are of value for providing a historical data base to assist in oil spill control. (Knapp-USGS)
W71-11349

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE COASTAL BASINS OF TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02L.
W71-11354

DETERMINATION OF ORGANICS IN WATER,
Pittsburgh Univ., Pa. Graduate School of Public Health.
Julian B. Andelman, Maurice A. Shapiro, and Thomas C. Ruppel.
Proceedings, Industrial Waste Conference, 20, held May 4, 5, 6, 1965, Vol XLIX, No. 4, p 220-234, 8 fig, 2 tab, 13 ref.

Descriptors: *Organic compounds, *Gas chromatography, Activated carbon, Distillation, Adsorption, Drying, Solvents, Evaporation, Temperature, Analytical techniques, Water purification, Pollution abatement, Pollutant identification.
Identifiers: *Acetophenone, *Pyridine, Phenol, Air-drying.

The amount and character of organics in water could be related to taste and odor and amount of pollution. Experiments were made in which samples were concentrated and the organics extracted. Gas chromatography was used to identify the organics. The samples used were passed through an activated carbon column on which the organic constituents were adsorbed. The water-wet carbon was air-dried, and the effect of air-drying was tested on the recoverability of the organics analyzed. The carbon used was acetophenone because it is one of the impurities found in river water and it is easily analyzed by gas chromatography. The results indicated that within experimental error, there is no essential difference between the two techniques, whether by using a single 62 to 65% recovery or two successive 81 to 85% recovery extractions of different aliquots of carbon with the same portion of solvent. This result should not be generalized to include all compounds, however, considering the wide range of organics which might be encountered in the carbon filtering of municipal or river waters. The lack of evidence of organics evaporating from wet carbon in the air-drying column should not be interpreted as meaning that none was so removed, since several highly efficient columns capable of resolving and detecting many different compounds were not utilized in the analysis. (Atkins-Texas)
W71-11380

DETERMINATION OF TRACE QUANTITIES OF NITRILOTRIACETIC ACID BY DIFFERENTIAL CATHODE RAY POLAROGRAPHY,
Department of Energy, Mines, and Resources, Ottawa (Ontario). Inland Waters Branch.
Badar K. Afghan, and Peter D. Goulden.
Environmental Science and Technology, Vol 5, No. 7, July 1970, p 601-606, 8 fig, 4 tab, 12 ref.

Descriptors: *Polarographic analysis, *Analytical techniques, *Chemical precipitation, *Pollutant identification, Heavy metals, Hydrogen ion concentration, Chelation, Phosphates, Detergents, Water analysis.
Identifiers: *Nitrilotriacetic acid, *Lead, Complexing, Cyanide, Interferences, *NTA.

Nitrilotriacetic acid (NTA) has already begun to replace phosphates in detergents. NTA is a powerful chelating agent which ordinarily will form complexes with the heavy metal group. A Davis differential cathode ray polarograph was utilized in an attempt to detect and measure quantities of NTA in the microgram range. NTA tested originated both in natural waters, and in an actual detergent. Free NTA was defined as that segment which was complexed with the alkaline earth elements. Free NTA plus the amount complexed by the heavy metals was designated at total NTA. Determination of free NTA in natural waters was based on complexing NTA with lead, and its measurement. Total NTA was determined by releasing the NTA from its complexed state under acid conditions, adding EDTA, elevating the pH to 8 to preferentially bind the metals to the EDTA, and determining the NTA again by the lead-NTA method. In detergents, NTA is measured by producing a bismuth-NTA reduction wave at pH2, followed by analysis with differential cathode ray polarography. The bismuth-NTA method has no interferences, does not require separation of phosphates prior to NTA determination, and can detect concentrations of 10 ug NTA/liter (as N (CH2-COOH)3) without preconcentration. (Lowry-Texas)
W71-11392

NITRIFICATION IN SURFACE WATERS TRIBUTARY TO LAKE SUPERIOR,
Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W71-11401

GAS CHROMATOGRAPHY: TECHNIQUES AND USES IN SOIL, PLANT, AND WATER ANALYSIS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 02K.
W71-11410

ENVIRONMENTAL ASPECTS OF MERCURY USAGE.
Dow Chemical Corp., Midland, Mich.
For primary bibliographic entry see Field 05C.
W71-11417

TECHNOLOGICAL TRENDS IN DETECTION AND CONTROL OF MARINE POLLUTION,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 05G.
W71-11448

POLONIUM-210 IN THE MARINE ENVIRONMENT,
Cape Town Univ. (South Africa).
For primary bibliographic entry see Field 05B.
W71-11469

MERCURY IN A COASTAL MARINE ENVIRONMENT,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W71-11470

SEMI-AUTOMATED DETERMINATION OF MERCURY IN FISH TISSUE,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
F. A. J. Armstrong, and J. F. Uthe.
In: 'Mercury in the Western Environment' workshop, Oregon State University, Portland, February 25-26, 1971. 14 p, 4 fig, 2 tab, 4 ref.

Descriptors: *Pollutants, *Fish, *Water pollution effects, *Heavy metal, Data collection, Spectrophotometry, Automation, Whitefish, Pikes, Walleye.
Identifiers: *Mercury, Canada.

An automated method for determining mercury in fish, using flameless atomic spectrometry, has been developed in Winnipeg. Samples of 0.1-0.5g. tissue are digested with nitric and sulphuric acids at 58LC, then cleared with hydrogen peroxide and made up to 25 ml. Mercury is then reduced with

hydroxylamine sulfate and the vapor equilibrated with air, using Technicon Auto Analyzer equipment. A mathematical relationship is used to calculate the performance of the system. Equilibration was very rapid and there was no alteration in sensitivity if the mixing coil was varied from one short to three long sections. The reagents used, in varying amounts, were potassium permanganate, acid wash, hydrogen peroxide, mercuric chloride (Standard A) and mercuric chloride (Standard B). Special apparatus used were: Perkin-Elmer model 403 atomic absorption spectrophotometer, lamp, chart recorder, flow-through cuvette, analysis manifold, and shaking water bath. The steps of the procedure followed are described. Tables give the amount of mercury recovered from the fish samples and show that standard deviation increases with increasing mercury content. The method is rapid and sufficiently precise for most inspection and research purposes. (Smith-PAI)
W71-11471

WATER QUALITY MEASUREMENTS BY SODIUM ION ANALYSIS FOR BOILER FEEDWATER APPLICATIONS,
Leeds and Northrup Co., North Wales, Pa. Analytical Equipment Div.
B. J. Galetti, and J. F. Spear.
Proceedings of the American Power Conference, Vol. 32, p 817-823, 1970. 4 fig, 2 tab, 3 ref.

Desriptors: *Sodium, *Stream, *Water treatment, Water quality, Hydrogen ion concentration, Power plants, Calibrations, Demineralization, Analytical techniques, Instrumentation, Electrodes.
Identifiers: *Sodium ion analyzer, Chemical interference.

The sodium ion analyzer package consists of an analyzer cabinet, calibration facility, monitor, pressure regulator, and pH adjusting reagent which, in this case, is a cylinder of dimethylamine gas. When required, a recorder is included in the system. The sodium ion analyzer has a response time of 15 to 30 seconds at 50 p.p.b. and up; reproducibility of plus or minus 2 percent; and sensitivity of better than 0.1 p the lowest decade of measurement, that is, from 0.1 to 1.0 p.p.b. The sodium ion analyzer can be used in a variety of industrial water treatment processes including cation, anion, and mixed bed demineralizers, stream-water purity measurements, turbine startups, and the detection of condenser leaks. (Mortland-Battelle)
W71-11482

EXPERIENCE WITH A CENTRALLY LOCATED WATER QUALITY MONITORING SYSTEM IN LARGE STEAM-ELECTRIC GENERATING PLANTS,
Tennessee Valley Authority, Chattanooga.
Carl Cain, Jr, and Joseph Greco.
Proceedings of the American Power Conference, Vol. 31, p 716-723, 1969. 4 fig, 3 tab.

Descriptors: *Hydroelectric plants, *Monitoring, *Tennessee Valley Authority Project, *Steam, *Boiler feed water, Water quality, Sampling, Sodium, Hydrogen ion concentration, Automation, Water analysis, Silica, Oxygen, Hydrogen, Electrical conductance.
Identifiers: Hydrazine.

In order to overcome the disadvantages of batch sampling and analysis, one of which is that the data are historical and do not reflect current conditions, the TVA has installed a centrally located water quality monitoring station where automatic monitors provide continuous analysis of key water quality parameters. Automatic analyzers were installed to record silica, pH, hydrazine, oxygen, hydrogen, and conductivities, including degasses conductivity of steam samples and after-cation conductivities of many of the water and steam samples. The central laboratory provides the environment required for proper functioning of automatic analytical instruments, the availability of uncontaminated samples for immediate verification analysis, and a composite picture of the entire water-steam cycle for rapid interpretation of data. (Mortland-Battelle)
W71-11483

RELEASE OF DISSOLVED ORGANIC MATTER BY MARINE PHYTOPLANKTON IN COASTAL AND OFFSHORE AREAS OF THE NORTHEAST PACIFIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
G. C. Anderson, and R. P. Zeutschel.
Available from the National Technical Information Service as RLO-1725-167, $3.00 in paper copy, $0.95 in microfiche, Atomic Energy Commission and Federal Water Pollution Control Administration Contract report RLO-1725-167, 1969, 14 p. 4 fig, 17 ref.

Descriptors: *Phytoplankton, *Sea water, *Organic matter, Photosynthesis, Pacific Ocean, Washington, Oregon, Columbia River, Nitrates, Chlorophyll, Nutrients, Oligotrophy, Eutrophication, Aquatic production.
Identifiers: *Liquid scintillation technique, Puget Sound.

Measurements were made of the rate of release of dissolved organic matter during phytoplankton photosynthesis in eutrophic and oligotrophic areas of the Northeast Pacific Ocean influenced by the Columbia River. A liquid scintillation counting technique which allows sample preparation to be done simply and accurately at sea was utilized. Little relationship was found between release of organic matter and chlorophyll concentration, nor was there an apparent relationship to nutrient concentrations as measured by nitrate. The absolute amounts of dissolved organic matter release were generally greatest near the surface and in eutrophic waters, but relative to total production were greatest in oligotrophic areas. A close correlation was found between the production of particulate organic matter and the release of dissolved organic matter. The results emphasize the importance of measuring release of organic matter when making estimates of primary production, especially in oligotrophic areas. (Mortland-Battelle)
W71-11485

IMPROVEMENT AND APPLICATION OF BENTHIC ALGAL ISOTOPE PRODUCTIVITY MEASURING METHODS,
Hawaii Univ., Honolulu. Dept. of Botany.
Maxwell S. Doty.
Available from the National Technical Information Service as UH-235P4-4, $3.00 in paper copy, $0.95 in microfiche, Atomic Energy Commission Contract report UH-235P4-4, June 1970. 54 p, 9 fig, 5 tab, 47 ref.

Descriptors: *Radioactivity techniques, *Benthic flora, *Growth rate, *Aquatic productivity, Radioisotopes, Tracers, Marine algae, Hawaii, Water temperature, Waves, Light intensity.
Identifiers: Philippines, Eniwetok, Micronesia, Fanning Islands.

Radioisotopes have been used as quantitative tracers in measuring rates of benthic algal production. Basic ecological studies on benthic reef algae have been completed or are underway. These studies have been conducted in Honolulu, Eniwetok, Micronesia, the Philippines, and Fanning Island. It was shown that the crop of some species vary seasonally with light, some with mean wave size, and some with temperature. Studies at Waikiki indicated that among benthic algae, standing crops of the crustose forms vary the least. (Mortland-Battelle)
W71-11486

BENTHIC INFAUNA COMMUNITIES OFF THE COAST OF WASHINGTON AND IN PUGET SOUND: SPECIES COMPOSITION AND STRUCTURE OF THE OFFSHORE COMMUNITIES,
Washington Univ., Seattle. Dept. of Oceanography.
Ulf Lie, and Dale S. Kisker.
Available from the National Technical Information Service as RLO-1725-174, $3.00 in paper copy, $0.95 in microfiche, Atomic Energy Commission Contract report. RLO-1725-174, 1970. 35 p. 6 fig, 6 tab, 29 ref.

Descriptors: *Benthos, *Amphipoda, Sediments, Shallow water, Deep water, Columbia River, Phytoplankton, Sampling, Statistical methods.
Identifiers: *Polychaetes, *Lamellibrachs, *Echinoderms, *Cumacean, Puget sound.

Benthic infauna collected off the coast of Washington during 1967 and 1968 were subjected to factor analysis, and three offshore benthic communities were identified. This paper presents the species composition and the structure of the three communities studied. The deepwater mud-bottom community was found in mean depths of 154.5 m and mean mud-percentage in the sediments of 50.09 percent. The mean standing crop (ash-free dryweight) was 3.058 g/m2 for the entire fauna. The intermediate depth sand-bottom community was found at stations with a mean depth of 95.8 m, and the mean mud-percentage of the sediments was 30.86 percent. The mean standing crop was 2.533 g/m2. The shallow water sand-bottom community was found at stations with a mean depth of 36.0 m and with a mean sand percentage in the sediments of 96.33 percent. The mean standing crop was 1.398 g/m2. The variability in diversity within the communities is discussed. There was a distinctly lower diversity within the shallow water sand-bottom community than in the two communities in deeper waters. (McCann-Battelle)
W71-11487

RESEARCH PROGRAM FOR ALERTING, DETECTION AND IDENTIFICATION OF PATHOGENS,
General Electric Co., Syracuse, N.Y. Electronics Lab.
J. R. Gould, O. P. Reynolds, A. M. Van Arendonk, J. R. Forro, and J. E. Smith.
Available from the National Technical Information Service as AD-711 672, $3.00 in paper copy, $0.95 in microfiche, Air Force Office of Scientific Research Contract report 70-2356-TR, July 1970. 58 p. 4 fig, 28 tab, 24 ref.

Descriptors: *E. coli, *Bioindicators, *Salmonella, *Gas chromatography, *Pollutant identification, *Pathogenic bacteria, *Human diseases, Clostridium, Viruses, Cultures, Biochemistry.
Identifiers: *Staphylococcus, Brucella, Newcastle disease, Influenza, Yellow fever, Herpes simplex, Sendia, Bacillus megaterium, Bacillus subtilis, Alcoligines.

This program assessed the feasibility of rapidly detecting and identifying pathogens when present in small populations. Gas chromatography was used to study viruses and bacteria. Both in vitro and in vivo investigations on viruses emphasized the need to develop a method of extracting products of interest from infected tissue cultures and sera that will result in reproducible gas chromatographic data. Viruses studied were Newcastle disease (NDV), influenza (A/PR8), yellow fever (YFV), Sendai, and herbes simplex (HSV) resulting from the infection of BHK-21 and RK-13 cells. With bacteria, it was found impossible to distinguish Brucella Canis from other Brucella by a GC of their metabolites. Analysis of the serum from mice infected with either Staphylococcus aureus, E. coli K-12, or Clostridium chauvoei revealed products associated with the infection within six hours after inoculation. Salmonella typhimurium and Clostridium species required longer periods. It was also demonstrated that a GC analysis of the serum of infected mice could be used to differentiate mixed infections. An evaluation of extraction techniques indicated that the use of semipermeable membranes is superior to a head space technique. (Mortland-Battelle)
W71-11489

SENSITIVITY OF BENTHIC MICROFLORA TO POLLUTION GRADIENTS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
Nelson Marshall, Donald M. Skauen, and Candance A. Oviatt.
Available from the National Technical Information Service as PB-192 853, $3.00 in paper copy, $0.95 in microfiche, Final Project Report, 1970. 70 p. 9 ref.

Descriptors: *Benthic flora, *Microorganisms, *Water pollution effects, *Aquatic productivity, Connecticut, Rhode Island, Estuaries, Shoals, Marshes, Spectrometers, Sediments, Thermal pollution, Trophic level, Domestic wastes.
Identifiers: Pettaquamscutt River (Rhode Island), Point Judith Pond (Rhode Island), Mystic River (Connecticut), Block Island Sound (Connecticut), Sample preservation, Liquid scintillation spectrometry.

A method was developed for measuring the productivity of the benthic microflora community and used to determine the normal rate of productivity of the microflora community of shoal benthic environments along the Connecticut-Rhode Island coastline. Replicate cores were obtained from the top 3/4 cm of sediment, kept intact, and placed in separate light and dark flasks containing 14C in filtered water from over the sampling site. The flasks were exposed to natural light for 3-1/2 hours and then transferred to glass fiber filters and washed to remove unbound 14C. Each sample was pulverized, suspended in Cab-O-Sil gel and counted by liquid scintillation spectrometry. The method was used to obtain data from four observation stations, one in an area affected by heavy domestic pollution, and one in an area now subjected to thermal pollution. Unfortunately, only preoperational data were obtained for the latter. The research was terminated before all of the objectives could be reached but the data are useful in analyses of trophic relationships in shoal benthic environments. The methodology has been used to obtain comparable data from marsh habitats. (Mortland-Battelle)
W71-11490

PROCEDURES FOR THE ANALYSIS OF METALS, ALLOYS, AND OTHER MATERIALS OF RESEARCH. PART 5 - AN INVESTIGATION OF THE CHEMICAL ANALYSIS OF CADMIUM-ZINC ARSENIDE,
Naval Research Lab., Washington, D.C.
O. R. Gates, and R. W. Black.
Available from the National Technical Information Service as AD-713 062, $3.00 in paper copy, $0.95 in microfiche, NRL Report 7146, September 17, 1970. 22 p. 3 fig, 4 tab, 4 ref.

Descriptors: *Spectrophotometry, *Arsenic compounds, *Polarographic analysis, Gravimetric analysis, Volumetric analysis, Separation techniques, Heavy metals.
Identifiers: *Cadmium, *Zinc, Atomic absorption.

Cadmium-zinc arsenide, which is used for semiconductor devices, has been analyzed by a combination of chemical and instrumental techniques. The following combined wet-chemical and atomic absorption spectrophotometric technique has been evolved that is capable of providing good analytical data: The arsenic is reduced to the trivalent state with hydrazine sulfate, distilled as the trichloride, and titrated with a standard iodine solution. Working with an aliquot of the solution remaining in the distilling flask, the cadmium and zinc are separated with hydrogen sulfide and determined as their respective sulfates. The cadmium and zinc residues, after being weighed, are redissolved, diluted to definite volumes, and examined by atomic absorption spectrophotometry to determine, and make proper adjustments for, the amount of zinc in the cadmium residue and the amount of cadmium in the zinc residue. Aliquots of the solution remaining in the distilling flask may also be analyzed spectrophotometrically to determine the effectiveness of the arsenic distillation and analyzed polarographically to provide additional cadmium and zinc data. Using a 1M ammonium chloride-ammonium hydroxide solution as the supporting electrolyte and a gelatin solution to suppress the zinc maxima, excellent polarographic diffusion current patterns are obtained for both cadmium and zinc. (McCann-Battelle)
W71-11491

OBSERVATIONS OF CARBON DIOXIDE IN THE SURFACE WATERS OF THE EASTERN NORTH PACIFIC OCEAN AND THE BERING SEA,
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
J. J. Kelley, and A. Hanson.
Available from the National Technical Information Service as AD-712545, $3.00 in paper copy, $0.95 in microfiche, Scientific Report No. 6, July 1970. 38 p. 5 fig, 6 tab, 2 ref. ONR.

Descriptors: *Carbon dioxide, *Salinity, *Solubility, Analytical techniques, Oxygen, Calibration, Surface waters, Pacific Ocean, Instrumentation, Automation, Infrared radiation, Water temperature.
Identifiers: *Infrared analyzer, Bering Sea, Data recorders.

Measurements of the equilibrium concentration of carbon dioxide in the air and surface waters of the North Pacific Ocean and the Bering Sea are presented. The analytical system, which included a mechanical sea water equilibrator, infrared analyzer, automatic cycling control, recorders, reference gases, and freezer, was installed in the wet laboratory of the OCEANOGRAPHER. Air, reference gases, and air, after equilibration with sea water, were automatically analyzed for CO2 by infrared analysis. A complete cycle took 30 minutes. Calibration data for the infrared analyzer system, and observations of sea surface temperature, oxygen solubility, and salinity are given along with a flow diagram of the system. (McCann-Battelle)
W71-11492

A STUDY OF PHYTOPLANKTON IN THE LESSER ANTILLES REGION,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
Paul E. Hargraves, Robert W. Brody, and Paul R. Burkholder.
Bulletin of Marine Science, Vol. 20, No. 2, p 331-349, June 1970. 2 fig, 4 tab, 26 ref.

Descriptors: *Phytoplankton, *Benthic flora, *Nutrients, Puerto Rico, Chlorophyll, Neritic, Seawater, Plankton nets, Samples, Bathythermographs, Dinoflagellates, Cyanophyta, Tropical regions, Phosphates, Nitrates, Systematics.
Identifiers: Antilles, Trinidad, Sample preservation, Silicoflagellates, Caribbean, Bacillariophyta.

In a marine biological survey of the Antillean region between Puerto Rico and Trinidad, 205 species of net phytoplankton were identified. Benthic organisms were more often observed at 'downstream' stations near islands, where chlorophyll values averaged 0.38 mg/cu m at 16 stations as compared with an average of 0.11 mg/cu m at 30 'upstream' stations. Growth of phytoplankton was generally limited by low nutrients (average nitrate 0.18 microgram-at 0.1 at surface stations) in the thermally stratified 120-meter photic zone. More abundant phytoplankton and nutrients near Trinidad are apparently related to land drainage and strong westerly currents. (Mortland-Battelle)
W71-11493

MERCURY IN THE NATURAL ENVIRONMENT: A REVIEW OF RECENT WORK,
Geological Survey of Canada, Ottawa (Ontario).
I. R. Jonasson.
Geological Survey of Canada Paper 70-57, 1970. 39 p. 245 ref.

Descriptors: *Neutron activation analysis, *Spectroscopy, Chromatography, Sampling, Path of pollutants, Groundwater, Rivers, Saline water, Heavy metals, Soils.
Identifiers: *Mercury, *Atomic absorption, *Catalytic methods, *Mass spectrometry, U.S.S.R., Mercury compounds, Methylation.

A review of mercury in the natural environment is presented to cover the literature published since the last major review which is that of James (1962). No attempt is made to give a complete bibliography of what has appeared in the scientific literature but rather, a comprehensive selection of what are considered to be the significant contributions to current knowledge is presented. The review is divided into sections on analysis for mercury and compounds, mercury in natural waters, aspects of pollution by mercury, and advances in the geochemistry of mercury in soils, ores and rocks. (McCann-Battelle)
W71-11494

THE FACILE DEGRADATION OF p,p'-DDT VIA p,p'-DDD USING CHROMOUS CHLORIDE AS REDUCING AGENT,
Department of Agriculture, Ottawa (Ontario). Plant Products Div.
A. S. Y. Chau, and W. P. Cochrane.
Bulletin of Environmental Contamination and Toxicology, Vol. 5, No. 2, p 133-138, March/April 1970. 2 fig, 1 tab, 18 ref.

Descriptors: *DDT, *Gas chromatography, Reduction (Chemical).
Identifiers: *DDD, *Chromous chloride, Dechlorination, DCS, DDNU, DDMU, DBP metabolites, Electron capture.

In order to investigate the degradation products of p,p'-DDT, the pesticide was reacted with aqueous chromous chloride and the resulting solution analyzed using an electron capture, gas-liquid chromatograph. Chromatograms indicated that three major products and three minor components were present. Approximately 45-55 percent of the reaction mixture was composed of DCS; 35-45 percent was DDNU, DBP, and DDMU together; and 5 percent was unreacted p,p'-DDT, p,p'-DDD, and o,p'-DDT. The presence of degradation products was confirmed by further analyses. (McCann-Battelle)
W71-11495

A SIMPLE TEST FOR DIFFERENTIATION BETWEEN E. COLI AND A. AEROGENES,
Technion-Israel Inst. of Tech., Haifa. Sanitary Engineering Labs.
Netty Buras, and Yehuda Kott.
Water Research, Vol. 3, p 973-978, 1969. 3 fig, 2 tab, 13 ref.

Descriptors: *Bioindicators, *E. coli, Water quality control, Analytical techniques, Bacterial isolations, Coliforms, Membranes, Microbiological method.
Identifiers: A. aerogenes.

A simple test is proposed based on a modification of the selective mFC medium and optimal incubation temperature (37C). Under these specific conditions E. coli develop into dark blue colonies, whereas A. aerogenes into pink ones. The intermediate coliform bacteria appear greenish-blue or pink, depending on their relation (closeness) to E. coli or A. aerogenes. (Little-Battelle)
W71-11497

PESTICIDES IN WATER: COPPER SULFATE IN FLOODED CRANBERRY BOGS,
Massachusetts Univ., East Wareham. Cranberry Experiment Station.
Karl H. Deubert, and Irving E. Demoranville.
Pesticides Monitoring Journal, Vol. 4, No. 1, p 11-13, June 1970. 1 tab, 7 ref.

Descriptors: *Copper sulfate, *Algae, *Floodwater, *Path of pollutants, Dieldrin, DDT, Organic matter, Analytical techniques, Sampling, Massachusetts, Pollutant identification.

Identifiers: *Cranberry bogs.

Cranberry bogs are treated with copper sulfate to control algal growth. In order to assess possible water pollution after release of treated floodwater into streams and ponds, the rate at which copper disappeared from the water after treatment was monitored in two separate bogs. In both bogs the concentration of copper 25 hours after application was higher than expected due to smaller volumes of floodwater. During the first 6 days after treatment, copper concentrations decreased rapidly, and after 10 days about 95 percent of the copper had disappeared. When floodwater was released about 4 weeks after treatment, the concentration of copper was at the same level found in the water prior to treatment. (McCann-Battelle)
W71-11498

MEMBRANE FILTER TECHNIQUE INNOVATIONS,
Denver Board of Water Commissioners, Colo.
William R. Van Nattan.
American Water Works Association Journal, Vol. 62, No. 10, p 616-619, October 1970. 4 fig.

Descriptors: *Membranes, *Test procedures, *Aquatic microbiology, Sampling, Fresh water, Data collections, Water analysis, Coliforms, Replication, Sterilization, Fecal streptococci, Colorado.
Identifiers: *Membrane filters, *Data interpretation, Data recording, Denver Board of Water Commissioners.

Methods of avoiding sample contamination, replicating membrane filters, interpreting test results, and miscellaneous applications of membrane filters are described. The methods are employed by the Quality Control Laboratory of the Denver Board of Water Commissioners. (Little-Battelle)
W71-11499

DETECTION OF MERCURY AND ALKYLMERCURY COMPOUNDS BY REVERSED-PHASE THIN-LAYER CHROMATOGRAPHY,
Institute of Public Health, Tokyo (Japan).
Ryuzo Takeshita, Hirokatsu Akagi, Masahiko Fujita, and Yoneji Sakagami.
Journal of Chromatography, Vol 51, No 2, p 283-288, September 16, 1970. 1 fig, 2 tab, 7 ref.

Descriptors: *Chromatography, Fish, Foods, Sewage, Copper, Heavy metals.
Identifiers: *Mercury, Avicel SF, Liquid paraffin, Corn starch, Chemical interference, Lead, Tin, Reagents, Adsorbents, Thin-layer chromatography, Methyl mercury, Mercury dithizonate.

A reversed-phase thin-layer chromatographic method for separation and detection of the dithizonates of inorganic mercury compounds and a series of alkylmercury compounds was investigated. The compounds investigated were the dithizonates and chlorides of mercury, methylmercury, ethylmercury, n-propylmercury, n-butylmercury, n-amylmercury, n-octylmercury, and stearylmercury. The specificity of this method was that all the compounds tested were distinctly separated and detected with high sensitivity. The detection limits of the dithizonates ranged from 0.01 to 0.1 microgram and for the chlorides ranged from .004 to .057 microgram. The influence of some of the other inorganic metals and excess dithizone was also examined. The method is applicable to the separation and identification of mercury compounds in foods and sewages. (McCann-Battelle)
W71-11505

DESIGN OF A COLUMN FOR THE GAS CHROMATOGRAPHIC ANALYSIS OF CHLORINATED HYDROCARBON PESTICIDES,
Commonwealth Lab., Melbourne (Australia). Customs House.
Ian S. Taylor.
Journal of Chromatography, Vol 52, No 1, p 141-144, October 7, 1970. 2 fig, 2 tab, 3 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Gas chromatography, *Separation techniques, Dieldrin, Heptachlor, Aldrin, DDT, Endrin, Pesticide residues.
Identifiers: HCB, Methoxychlor, Chlordane, Alpha-BHC, Lindane, Telodrin, DDD.

The theory of separation of pesticides by order of their vapor pressure using mixed stationary phases is described. In experimental work, retention data were collected for chlorinated hydrocarbon pesticides using the following stationary phases: DC-100 (methyl silicone); QF-one (trifluro propyl methyl silicone); XE-60 (cyanoethyl methyl and dimethyl silicone); zonyl E-7 (fluoroalkyl pyromellitie ester); NPGS (poly (neopentyl glycol succinate), (HI-EFF 3B)). Of those phases that satisfactorily separated HCB, alpha-BHC, and lindane, XE-60 and QF-1 do not distinguish sufficiently between DDD and DDT, and zonyl appears to cause some breakdown of DDT. NPGS seems more useful, although separation of DDE and dieldrin is inadequate. As QF-one selectively retains the oxygenated compound dieldrin, the possibility of using it to modify a column of NPGS emerged. (Mortland-Battelle)
W71-11506

TRACE METAL ANALYSIS BY COMBINED THIN-LAYER CHROMATOGRAPHY INCORPORATING FLUORESCENT SUPPORT AND RING OVEN COLORIMETRY,
Delhi Univ. (India). Dept of Chemistry.
K. N. Johri, and Harish C. Mehra.
Microchemical Journal, Vol 15, No 4, p 642-648, December 1970. 2 fig, 2 tab, 10 ref.

Descriptors: *Gas chromatography, *Colorimetry, *Ions, *Separation techniques, Heavy metals, Copper, Cobalt.
Identifiers: *Thin-layer chromatography, *Cadmium ions, Lead ions, Bismuth ions, Uranium ions, Thorium ions, Nickel ions.

Clean and rapid analytical separation of microgram quantities of Pb (II), Bi (III), U (VI), Th (IV), Cu (II), Ni (II), Co (II), and Cd (II) from their mixed solutions was accomplished by ascending thin-layer chromatography. A silica gel support was used and evaluation was done by a ring oven colorimetry technique. For separation of Pb (II), Bi (III), U (VI), and Th (IV), methylethyl ketone must be present in the solvent to prevent tailing of the spots. For separation of the other ions, acetic acid in the solvent system serves the same purpose. For evaluation, the delineated spots were scooped out with the help of a Mottier gadget, and the collected material was transferred to paper set on the ring oven. Potassium thiocarbonate and other chromogenic reagents were used for colorimetry to compute the results. (Mortland-Battelle)
W71-11513

FLUORIDE CONTENT OF FISH PROTEIN CONCENTRATE AND RAW FISH,
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
P. J. Ke, H. E. Power, and L. W. Regier.
Journal of the Science of Food and Agriculture, Vol 21, No 2, p 108-109, February 1970. 3 tab, 16 ref.

Descriptors: *Fluorides, *Herring, *Analytical techniques, Distillation, Membrane processes, Electrodes.
Identifiers: *Fish protein concentrate, *Specific ion meter, *Fluoride solid-membrane electrode, Cod, Haddock, Capelin, Dogfish, Skate, Canada.

The fluoride content of fish protein concentration (FPC) prepared by the Halifax isopropanol process and also of several possible raw materials was determined by distillation without fusion. The concentration of fluoride in this dry material ranged from 20 to 760 ppm and was dependent upon the raw materials. The major source of the fluoride was the bones which were incorporated in the product to a variable extent. The levels in fresh fillets ranged between 2.3 and 5.4 ppm while whole eviscerated fish contained 3.6-57 ppm fluoride. The results show that there will be significant variations in the fluoride content of fish protein concentrate. The species of fish used as the raw material is probably the most important factor in fluoride level, but large variations may be expected within each species. Studies are underway to establish the sources and fate of the fluoride in the FPC process as well as to devise a means to decrease the level of fluoride in this product. (McCann-Battelle)
W71-11514

ANALYSIS OF TRACE ELEMENTS IN SEAWEED,
Central Inst. for Industrial Research, Oslo (Norway).
G. Lunde.
Journal of the Science of Food and Agriculture, Vol 21, No 8, p 416-418, August 1970. 4 tab, 18 ref.

Descriptors: *Aquatic algae, *Neutron activation analysis, *Trace elements, Copper, Molybdenum, Manganese, Cobalt, Iron, Industrial wastes, Sewage effluents, Pollutant identification.
Identifiers: *Atomic absorption, Arsenic, Selenium, Zinc, Antimony, Norway, Ashing, Biological magnification, Pelvetia canaliculata, Fucus serratus, Fucus spiralis, Fucus vesiculosus, Laminaria digitata, Laminaria hyperborea, Ascophyllum nodosum, Gigartina mamillosa, Rhodymenia palmata.

The following trace elements have been analyzed by neutron activation and atomic absorption in various algae samples: arsenic, copper, molybdenum, manganese, zinc, cobalt, antimony, selenium and iron. The ash content has also been determined. The samples were collected from two different localities in Norway, one (Trondheimsfjord) characterized by a relatively strong influence of river water, industrial waste etc.; the other (Reine in Lofoten) is free from this type of contamination. In the case of two species, Ascophyllum nodosum and Laminaria hyperborea, the variation in the content of trace elements has been studied during a one-year period, samples being taken every second month. Considerable differences in the content of trace elements was found between the Laminariaceae and Fucaceae. The results indicate that the marine algae generally contain larger concentrations of the trace elements analyzed, especially arsenic, than do terrestrial plants. Arsenic is enriched in marine algae by a factor of 200 to 500. More attention should be focused on how this element occurs and whether or not it has any physiological role in marine algae. (Mortland-Battelle)
W71-11515

CHLORINE RESIDUAL ANALYZER/MONITOR CHALLENGES NEED FOR SIMPLICITY, ACCURACY, RELIABILITY,
Capital Controls Co., Inc., Colmar.
N. K. Stenberg.
Water and Wastes Engineering, Vol 7, No 12, p 41-42, December 1970. 2 fig.

Descriptors: *Chlorine, *Sewage effluents, *Monitoring, Electrodes, Calibration, Copper, Gold, Instrumentation, Hardness (Water), Hydrogen ion concentration, Analysis.
Identifiers: *Chlorine residual analyzer.

A chlorine residual analyzer has been developed for simple, accurate, and reliable measurement of water or waste water effluents. The analyzer contains a measuring cell that continuously samples water flowing between metal electrodes where a current, proportional to the chlorine residual, is generated. The cell output is an electrical current that can be readily adapted to recording instruments operating in the microammeter range. Additional advantages of the analyzer are: simple construction and installation, elimination of frequent adjustments and calibration, simple and accurate

means of feeding reagents, high speed of response, positive cleanliness of electrode surfaces, constant sample flow, temperature compensation and provision for pH compensation. (McCann-Battelle)
W71-11518

THE EFFECTS OF SERUM COMPONENTS ON THE AGGLUTINATION OF GRAM-NEGATIVE BACTERIA,
McGill Univ., Montreal (Quebec). Dept. of Microbiology and Immunology.
L. Melching, and S. I. Vas.
Canadian Journal of Microbiology, Vol 16, No 2, p 121-124, February 1970. 2 tab, 22 ref.

Descriptors: *E. coli, *Bioindicators, *Cultures.
Identifiers: Agglutination titers, Serum, Agar, Salmonella newport, Salmonella typhimurium, Proteus OX19.

During a study of the effect of serum on bacterial cells (E. coli), it was observed that the addition of fresh guinea pig serum to an agglutination test increased the agglutination titer. Absorption of fresh serum with homologous bacterial cells did not remove the activity. Exposure of fresh serum to 56 C for 30 min, 0.01 M ethylenediaminetetraacetic acid (EDTA), or 150 microgram/ml of lipopolysaccharide significantly decreased its activity. This reaction was shown to be initiated at 37 C, but not at 0 C, thus indicating an enzymatic reaction, possibly that of the complement system. Other sources of fresh serum were also found to mediate this reaction. Although this phenomenon requires further investigation, it should be considered when evaluating the bactericidal effect of serum from plate counts, as some decrease in numbers could be due to agglutination. (Mortland-Battelle)
W71-11524

ARSENIC AND PHOSPHATE: MEASURED BY VARIOUS TECHNIQUES,
Minnesota Univ., Minneapolis. Limnological Research Center.
Joseph Shapiro.
Science, Vol 171, No 3968, p 234, January 22, 1971. 3 ref.

Descriptors: *Arsenic compounds, *Phosphates, *Analytical techniques, Aquatic plants, Path of pollutants, Minnesota, New York, Lakes.
Identifiers: Harvey method, Stephens technique.

Most analytical techniques for measuring phosphates in water is not distinguished between phosphate and arsenate. When large concentrations of arsenic are present, measurements for phosphates are erroneous. While the Stephens technique eliminates some of the errors of the Harvey method, this technique is not entirely free of arsenate interference. The author and others have developed a bioassay that completely eliminates arsenate interference. No details of the method are given. (Mortland-Battelle)
W71-11525

SEASONAL CHANGES IN THE ZOOPLANKTON OF SOUTH BISCAYNE BAY AND SOME PROBLEMS OF ASSESSING THE EFFECTS ON THE ZOOPLANKTON OF NATURAL AND ARTIFICIAL THERMAL AND OTHER FLUCTUATIONS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
For primary bibliographic entry see Field 05C.
W71-11526

TAXONOMY AND DISTRIBUTION PATTERNS OF PLANKTONIC DIATOMS IN THE EQUATORIAL PACIFIC,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
T. V. Belyayeva.
Oceanology (USSR), Vol 10, No 1, p 101-107, 1970. 6 fig, 1 tab, 15 ref.

Descriptors: *Diatoms, *Phytoplankton, *Pacific Ocean, *Algae.
Identifiers: Juday net, Asterolampra marylandica, Asterolampra heptactis, Bacteriastrum comosum, Chaetoceros atlanticus var. neapolitana, Chaetoceros coarctatus, Chaetoceros lorenzianus, Chaetoceros messanensis, Chaetoceros peruvianus, Cladogramma kolbei, Cladogramma crenulatus, Cladogramma lineatus-excentricus, Cladogramma nodulifer, Dactyliosolen mediterraneus, Ethmodiscus gazellae, Ethmodiscus rex, Hemiaulus hauckii, Hemidiscus cuneiformis, Planktoniella sol, Podosira sp., Rhizosolenia alata, Rhizosolenia bergonii, Rhizosolenia calcar-avis, Rhizosolenia castracanei, Rhizosolenia styliformis, Roperia tessellata, Roperia tessellata var. ovata, Thalassiosira decipiens, Thalassiosira subtilis, Triceratium cinnamomeun var. minor, Amphora sp., Nitzschia aequatorialis, Nitzschia bicapitata, Nitzschia braarudii, Nitzschia delicatissima, Nitzschia marina, Nitzschia sicula, Pseudoeunotia doliolus, Stigmaphora rostrata, Thalassionema nitzschioides var. obtusa, Thalassionema nitzschioides var. parva, Thalassiothtix gibberula, Thalassiothtix vanhoffenii, Tropidoneis sp.

The content and distribution of diatoms in the plankton of the equatorial part of the Pacific Ocean were studied on four meridional sections along 160 E long. and 176, 154 and 140 W during September-December 1961. The phytoplankton collections were made with a Juday net to a depth of 100 m. All the diatoms found in this region are listed together with an indication of the frequency of occurrence of each species on the sections. Ninety-seven planktonic diatomaceous algae were found in the central and eastern parts of the Pacific Ocean: 86 of them were identified as to species, 9 only as to genus, and two of the diatoms have not been identified as to genus. Most of the diatoms in our region are tropical species. Eighteen of the species occur not only in the tropical regions but also in the boreal region (12 species) or in the Antarctic region (6 species). The widely diffused (cosmopolitan) species found amounted to 13. (McCann-Battelle)
W71-11527

SPATIAL HOMOGENEITY: STATISTICAL ANALYSES OF UNISPECIES AND MULTISPECIES POPULATIONS OF FORAMINIFERA,
Smithsonian Institution, Washington, D.C. Div. of Invertebrate Paleontology.
For primary bibliographic entry see Field 05C.
W71-11528

CALCIUM AND STRONTIUM DISCRIMINATION BY AQUATIC PLANTS,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 05C.
W71-11529

POTENTIOMETRIC MICRODETERMINATION OF PHOSPHATE WITH AN ION-SELECTIVE LEAD ELECTRODE,
California Univ., Livermore. Lawrence Radiation Lab.
Walter Selig.
Mikrochimica Acta, p 564-571, 1970. 3 fig, 4 tab, 8 ref.

Descriptors: *Phosphates, *Electrodes, *Potentiometers, Sulfates, Organic matter, Volumetric analysis, Nitrates, Chlorides, Fluorides, Silicates.
Identifiers: *Chemical interference, Inorganic material, Oxalate, Lead perchlorate, Lead sulfate, Molybdates, Tungstates, Chromates.

Lead-specific electrodes have been used for the determination of sulfate in inorganic and organic materials, and for the determination of oxalate. These anions have been determined by potentiometric titration with lead perchlorate, in a partially nonaqueous medium needed to reduce the solubilities of the various lead salts and thus enhance the potential breaks near the endpoints of the titrations. Phosphate forms as extremely insoluble lead salt which titrates potentiometrically with lead perchlorate in an aqueous medium. Solutions have to be buffered to pH 8.25 to 8.75 for precipitation of the normal orthophosphate. Sulfate and nitrate do not interfere, while chloride and fluoride cause slightly high results. Silicate should not be present in amounts larger than the phosphate. Anions which form an insoluble lead salt with a solubility product smaller than that of lead sulfate, such as molybdate, tungstate, and chromate will interfere in this determination. (McCann-Battelle)
W71-11530

THE USE OF COLLABORATIVE STUDIES TO EVALUATE WATER ANALYSIS INSTRUMENTS,
Environmental Control Administration, Cincinnati, Ohio.
Earl F. McFarren, and Raymond J. Lishka.
Journal Water Pollution Control Federation, Vol 43, No 1, p 67-72, January 1971. 9 tab, 5 ref.

Descriptors: *Evaluation, *Instrumentation, Fluoride, Electrodes, Pesticides, Gas chromatography, Copper, Manganese, Spectrophotometry, Phosphates, Nitrates, Ammonia, Nutrients.
Identifiers: Zinc, Atomic absorption spectrophotometer, Auto-analyzer, Collaborative studies.

With the great number of instruments necessary to operate a water chemistry laboratory and the numerous models of each type of instrument that are available, some rational means is needed to select the instrument most satisfactory for a particular purpose. This paper suggests that the best means of evaluating instruments may be by collaborative study in which the results would present the objective evaluations of many laboratories. As examples of how this might work, the results of four recent Analytical Reference Service studies are presented. Although these studies were designed to evaluate specific methods, evaluation of instruments was a necessary part of the procedure. The four examples dealt with fluoride, pesticides, metals, and nutrients. These studies indicate that this is a satisfactory means of evaluation. However, to be meaningful, results from at least six laboratories must be available for each instrument evaluated. (Mortland-Battelle)
W71-11532

THE DETERMINATION OF SULPHATE IN SEA WATER BY MEANS OF PHOTOMETRIC TITRATION WITH HYDROCHLORIC ACID IN DIMETHYL SULPHOXIDE,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W71-11536

A RAPID SEMI-AUTOMATIC METHOD FOR THE DETERMINATION OF THE TOTAL HALIDE CONCENTRATION IN SEA WATER BY MEANS OF POTENTIOMETRIC TITRATION,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W71-11537

A RAPID METHOD FOR THE DETECTION AND DETERMINATION OF CAPTAN,
Central Food Technological Research Inst., Mysore (India).
K. Visweswariah, M. Jayaram, and S. K. Majumder.
Analytica Chimica Acta, Vol 52, No 3, p 559-561, December 1970. 9 ref.

Descriptors: *Fungicides, *Analytical techniques, *Pollutant identification, Aldrin, DDT, Dieldrin, Hydrolysis.
Identifiers: *Captan, Lindane, BHC, Malathion.

The reaction of Captan with monoethanolamine in the presence of insecticides such as Aldrin, DDT, BHC, Malathion can be used for quantitative identification. Captan when hydrolysed with monoethenolamine for 1 min in a boiling water bath, turns immediately blue, which gradually becomes yellow on further heating; concentrations of Captan above 100 micrograms under identical conditions first turn pale-yellow and then orange red on prolonged heating. The chlorinated insecticides like BHC, DDT, Lindane, Aldrin, Dieldrin and Endrin did not produce the blue color, hence the reaction can also be used to distinguish Captan from the other chlorinated insecticides. Captan was determined in different formulations consisting of starch and Captan, by means of a calibration curve, and it was established that the precision of the method was plus or minus 2.5 percent. Captan in amounts above 100 micrograms produced different colors depending on the quantity, when hydrolysed with monoethanolamine for 10 min; a yellow color was observed with 0.1-2.0 mg, and orange color with 2-4 mg, a red color with 4-5 mg and a blood-red color with 5.0 mg. Accordingly, an approximate estimate of Captan concentration can be made in this range. (Mortland-Battelle)
W71-11538

FILTERABILITY OF STREPTOCOCCAL L-FORMS,
North Carolina Univ., Chapel Hill. Dept. of Bacteriology and Immunology.
For primary bibliographic entry see Field 05D.
W71-11539

SOURCE OF POLYCHLORINATED BIPHENYL CONTAMINATION IN THE MARINE ENVIRONMENT,
Freshwater Fisheries Lab., Pitlochry (Scotland).
For primary bibliographic entry see Field 05B.
W71-11541

DETERMINATION OF MERCURY IN BIOLOGICAL MATERIALS,
Food and Drug Administration, Dallas, Tex.
M. T. Jeffus, J. S. Elkins, and C. T. Kenner.
Journal of the Association of Official Analytical Chemists, Vol. 53, No. 6, p 1172-1175, November 1970. 2 fig, 2 tab, 8 ref.

Descriptors: *Spectrophotometry, Digestion, Reduction (Chemical), Adsorption, Absorbance, Analytical techniques, Potassium, Fishes, Laboratory equipment, Pollutant identification.
Identifiers: *Mercury, *Biological samples, *Atomic absorption.

Mercury in biological samples is determined by digestion in nitric acid, sulfuric acid, and permanganate, followed by reduction and aeration for measurement by atomic absorption at room temperature. The average recovery is 95.8 percent with a standard deviation of 13.3 percent. The standard deviation, calculated from the difference between duplicates of 23 samples, is 0.063 microgram mercury, which represents 9.4 percent of the average value of the samples. The method is simple and requires approximately 4 hr for completion. Mercury can be confirmed by adsorption on gold foil after maximum absorbance has been obtained during aeration. (McCann-Battelle)
W71-11545

A RE-EXAMINATION OF THE BY-PRODUCT OBTAINED DURING THE PREPARATION OF DDA AND UNIEQUIVOCAL DIFFERENTIATION OF DDE AND DDNU,
Food and Drug Directorate, Ottawa (Ontario). Research Lab.
B. Stavric, and G. A. Neville.
Journal of the Association of Official Analytical Chemists, Vol. 53, No. 6, p 1270-1275, November 1970. 1 tab, 41 ref.

Descriptors: *Pesticide residues, *DDT, Nuclear magnetic resonance, Spectroscopy, Gas chromatography, Infrared, Pollutant identification.
Identifiers: *Metabolites, DDE, DDA, DDNU, Infrared spectra, Infrared spectroscopy.

As the result of unexpected chemical behavior encountered in a study with the DDT-metabolites 1,1-bis (p-chlorophenyl)ethylene (DDNU) and 1,1-dichloro-2,2-bis (p-chlorophenyl)ethylene (DDE), the characterization of these two compounds was re-examined and found to be at variance with data found in the chemical literature. DDNU and DDE have now been more fully differentiated and characterized by NMR and IR spectroscopy, and the principal IR bands of each have been assigned and discussed. (McCann-Battelle)
W71-11546

GAS CHROMATOGRAPHIC ANALYSIS FOR ALPHA-OLEFIN SULFONATE,
Lion Fat and Oil Co. Ltd., Tokyo (Japan).
Toshio Nagai, Shigeru Hashimoto, Izumi Yamane, and Akira Mori.
Journal of the American Oil Chemists' Society, Vol. 47, No. 12, p 505-509, December 1970. 7 fig, 8 tab, 18 ref.

Descriptors: *Gas chromatography, *Sulfonates, *Separation techniques, Detergents, Hydrogenation, Pollutant identification.
Identifiers: *Decomposition, *Alpha-olefin sulfonate, Alkene sulfonate, Hydroxyalkane sulfonate.

The separation and determination of alkene sulfonate and hydroxyalkane sulfonate, and the carbon chain distribution of the lipophilic groups of long chain alpha-olefin sulfonates (C14 and C18) were studied by means of gas chromatography. Samples were hydrogenated initially, and converted to sulfonyl chlorides for gas chromatographic analysis. Using a glass column, 4 mm i.d. and 2.5 m long, packed with Silicon SE-30, 3 percent on 60 to 80 mesh Chromosorb WAW treated with hexamethyldisilazane, a 0.3 to 0.6 micro liter sample, as 10 percent carbon tetrachloride solution, was injected directly on the column, and alkane and monochloroalkane sulfonyl chloride were determined as alkyl chloride and alkyl dichloride, respectively. Minimization of further decomposition, improvement of peak separation and reproducibility were accomplished by this procedure. The method was applied to alpha-olefin sulfonates produced commercially from C14 to C18 alpha-olefins. (McCann-Battelle)
W71-11549

LAKE ERIE PHYSICAL LIMNOLOGY CRUISE, MIDSUMMER 1967,
Ohio Dept. of Natural Resources, Columbus. Div. of Geological Survey.
For primary bibliographic entry see Field 05C.
W71-11551

ARSENIC IN POTABLE DESERT GROUNDWATER: AN ANALYSIS PROBLEM,
Naval Weapons Center, China Lake, Calif.
G. C. Whitnack, and H. H. Martens.
Science, Vol. 171, No. 3969, p 383-385, January 29, 1971. 2 fig, 2 tab, 12 ref.

Descriptors: *Arsenic compounds, *Polarographic analysis, *X-Ray fluorescence, *Colorimetry, California, Trace elements, Spectroscopy, Groundwater, Copper, Cobalt, Gold, Manganese, Aluminum, Molybdenum, Chromium, Iron, Color, Spectrophotometry, Potable water, Pollutant identification.
Identifiers: Chemical interference, Silver diethyldithiocarbamate method, American Public Health Association, Silver, Lithium, Strontium, Lead, Nickel, Zinc, Antimony, Vanadium.

An accuracy investigation, initiated because of conflicting analytical data on the arsenic content for some 24 drinking water locations in the Mojave Desert, revealed that interference with the evolution of arsine in the American Public Health Association silver diethyldithiocarbamate method caused either color enhancement or arsine suppression. For certain types of natural waters this method is unreliable. (McCann-Battelle)
W71-11552

QUANTITATIVE DISTRIBUTION OF DIFFERENT TROPHIC GROUPS OF BOTTOM INVERTEBRATES IN THE BARENTS SEA,
Moscow State Univ. (USSR). Dept. of Hydrobiology.
V. I. Zatsepin.
Oceanology (USSR) Vol. 10, No. 1, p 119-129, 1970. 7 fig, 1 tab, 40 ref.

Descriptors: *Biomass, *Invertebrates, Benthos, Organic matter, Sampling, Detritus, Food, Habits, Benthic fauna, Sediments, Distribution patterns.
Identifiers: *Barents Sea (U.S.S.R.), Epifauna, Infauna, Detritophages, Astarte borealis, Astarte Montagui, Macoma calcarea, Clinocardium ciliatum, Serripes groenlandicus, Nuculana pernula, Yoldia hyperborea, Portlandis arctica, Balanus balanus, Hiatella arctica, Chlamys islandicus, Cucumaria frondosa, Strongylocentrotus droebachiensis, Astarte arctica, Astarte elliptica, Astarte crenata, Bathyarca glacialis, Spiochaetopterus typicus, Cystenides hyperborea, Ampharetidae.

On the basis of almost 1000 quantitative samples of bottom fauna collected with the Petersen grab, maps have been compiled showing the distribution in the Barents Sea of the total biomass of macrobenthos and the biomass of the principal trophic groups of bottom invertebrates. The filter-feeders are the most important component in the total biomass, accounting for about 40 percent; these are followed by the detritophages, with 26 percent; and by the bottom sediment feeders with 17 percent. The food biomass of the macrobenthos of the Barents Sea amounts to about one third of the total reserves. A zonal distribution and quantitative growth of the principal trophic groups from shoreline outward is as follows: Zone 1, filterers of epifauna; Zone 2, filterers of infauna; Zone 3, detritophages, Zone 4, sediment feeders predominate. The heaviest growth of detritophages is observed on bottoms with a high content of organic carbon (up to 3 percent) and a sedimentation rate ranging from 3 to 10 cm in 1000 years. The heaviest concentration of infauna filterers is found in the southern region of bottom sediment accumulation, and it usually coincides with areas having a low concentration of noncarbonate carbon (to 1 percent), with sedimentation rates ranging from 10 to 30 cm per thousand years, and with a content of suspended sediment in the water not less than 0.3-0.4 g/cu m. (McCann-Battelle)
W71-11553

QUANTITATIVE SPECTRAL ANALYSIS OF SOME MICROELEMENTS IN MARINE SEDIMENTS,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
E. A. Meyshtas.
Oceanology (USSR) Vol. 10, No. 2, p 286-293, 1970. 4 fig, 5 tab, 10 ref.

Descriptors: *Sediments, *Pollutant identification, Oxides, Trace elements, Chlorides, Chromium, Molybdenum, Copper, Zirconium, Electrodes, Spectroscopy, Heavy metals.
Identifiers: *Spectral emission analysis, Barium, Beryllium, Lead, Tin, Nickel, Vanadium, Strontium, Germanium.

Spectral emission quantitative analysis can be used with success in the investigation of marine sediments. There are no special differences between this form of analysis of sediments and spectral determinations of microelements in other geological objects. The principal feature of the spectral

analysis of marine sediments is the fact that these sediments are very diverse in macrocomposition (particularly with respect to CaCO3 content). Therefore, it is obvious that efforts to develop a single method for all types of sediments are useless. The method described, which is an improved cathode-layer method, was developed only for the so-called normal marine sediments. (Mortland-Battelle)
W71-11554

ISOLATION METHODS AND SOME BIOLOGICAL FEATURES OF MICROORGANISMS OXIDIZING GASEOUS HYDROCARBONS,
Akademiya Nauk URSR, Kiev. Inst. of Microbiology and Virology.
For primary bibliographic entry see Field 05C.
W71-11559

CERTAIN ASPECTS OF PRODUCTION AND STANDING STOCK OF PARTICULATE MATTER IN THE SURFACE WATERS OF THE NORTHWEST ATLANTIC OCEAN,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 05C.
W71-11562

EXPLANATION OF SOME LUBRICATING OIL HYDROCRACKING RESULTS IN TERMS OF THE STRUCTURE OF THE VISCOSITY INDEX SCALE,
Mobil Research and Development Corp., Paulsboro.
Bernard Gillespie, and Fritz A. Smith.
Industrial and Engineering Chemistry Product Research and Development, Vol 9, No 4, p 553-558, December 1970. 9 fig, 3 tab, 11 ref.

Descriptors: *Oils, *Viscosity, Oil industry, Distillation.
Identifiers: *Lubricating oils, *Hydrocracking, Hydrocarbons, Oil characterization.

Hydrocracking is a process that can be used to produce lubricating oils and that offers the advantage of oils with better viscosity - temperature dependence than is obtained by solvent extraction. However, a variation of viscosity index (VI) among distillation fractions is obtained. A study of the viscosity index system was undertaken with the following results. Measurements on hydrocracked lubricating oils exhibit two anomalies: As hydrocracking severity is increased, viscosity index of the product oil increases to a maximum and then decreases, and fractions distilled from a hydrocracked oil exhibit a wide range of VI's; the lower-boiling fractions always are significantly lower in VI than the full range oil. Both of these unexpected results have been traced to a discontinuity in the VI system. Alternative systems for rating the viscosity-temperature. Characteristics of lube oils have been examined, but none is completely satisfactory. A modified system has been outlined which would remove molecular weight effects, and therefore present a somewhat more fundamental basis for the viscosity-temperature rating system. (Mortland-Battelle)
W71-11563

SELECTIVE DETERMINATION OF INORGANIC MERCURY IN THE PRESENCE OF ORGANOMERCURIAL COMPOUNDS IN BIOLOGICAL MATERIAL,
Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
T. W. Clarkson, and M. R. Greenwood.
Analytical Biochemistry, Vol 37, p 236-243, October 1970. 2 fig, 2 tab, 16 ref.

Descriptors: *Fungicides, *Analytical techniques, *Pollutant identification, Radioisotopes, Reduction (Chemical), Urine, Aqueous solutions.
Identifiers: *Mercury, Organomercurial compounds, Scintillation counting, Biological samples, Blood.

A method is described for selectively measuring radioactive inorganic mercury in the presence of organomercurial compounds labeled with Mercury-203 isotope. This method utilizes the selective reduction of inorganic mercury by SnCl sub 2 to elemental vapor. The latter is swept from the sample by an air stream collected on a specific absorbent, Hopcalite, where the radioactivity is determined by gamma scintillation counting. This method may be used for the study of the cleavage of the carbon-mercury bond in animals injected with labeled organomercurial compounds. It is sufficiently sensitive to permit studies well below toxic levels. (Mortland-Battelle)
W71-11564

SIMULTANEOUS DETERMINATION OF SILICATE AND PHOSPHATE BY AN AUTOMATED DIFFERENTIAL KINETIC PROCEDURE,
Michigan State Univ., East Lansing. Dept. of Chemistry.
J. D. Ingle, Jr., and S. R. Crouch.
Analytical Chemistry, Vol 43, No 1, p 7-10, January 1971. 2 fig, 2 tab, 18 ref.

Descriptors: *Silicates, *Phosphates, *Kinetics, Pollutant identification, Spectrophotometry, Automation.
Identifiers: *Differential kinetic method, Chemical interference.

A differential kinetic method is presented for simultaneous determinations of silicate and phosphate in mixtures. Phosphate and silicate each react with Mo (VI) to form yellow heteropoly acids which can be reduced to heteropoly blues. The initial rate of formation of the heteropoly blue from phosphate can be made much faster than the corresponding silicate heteropoly blue under certain experimental conditions. Thus phosphate can be determined with little interference from silicate. Silicate can be determined under a second set of conditions by measuring the initial rate of formation of Beta-12-molydosilicic acid, which forms at a much slower rate than 12-molybdophosphoric acid. Data are presented to illustrate that 1-10 ppm of silicon can be determined in the presence of up to 10 ppm of phosphorus with better than 3 percent accuracy. Simultaneous phosphate determinations in the 1-10 ppm of P range in the presence of up to 50 ppm of Si can be made with 1 percent accuracy. Both species can be determined in mixtures in less than five minutes of total analysis time using an automated reaction rate system. (Mortland-Battelle)
W71-11565

POLAROGRAPHIC DETERMINATION OF TRACES OF NITRILOTRIACETATE IN WATER SAMPLES,
Proctor and Gamble Co., Cincinnati, Ohio. Miami Valley Labs.
John P. Haberman.
Analytical Chemistry, Vol 43, No 1, p 63-67, January 1971. 5 fig, 3 tab, 13 ref.

Descriptors: *Detergents, *Polarographic analysis, Sewage, Pollutant identification, Anion exchange, Cation exchange, Activated sludge.
Identifiers: *Nitrilotriacetate.

A sensitive and selective method for determining trace amounts of nitrilotriacetate, a component in detergent formulations, is described. Polarographic analysis of NTA as an In (III)-NTA complex was used. The technique was evaluated in river water and sewage samples from 0.0257 to 2.57 ppm with anion exchange concentration and isotope dilution to correct for incomplete recovery. It was evaluated from 2.57 to 257 ppm without anion exchange concentration. The relative standard deviation was approximately 10 percent, except for the lowest concentration. (Mortland-Battelle)
W71-11566

SPECTROFLUORIMETRIC DETERMINATION OF TRACES OF FLUORIDE ION BY TERNARY COMPLEX FORMATION WITH ZIRCONIUM AND CALCEIN BLUE,
Imperial Coll. of Science and Technology, London (England). Dept of Chemistry.
Tan Lay Har, and T. S. West.
Analytical Chemistry, Vol 43, No 1, p 136-139, January 1971. 5 fig, 1 tab.

Descriptors: *Fluorides, *Fluorescence, Ions, Aqueous solutions, Cations, Anions, Pollutant identification.
Identifiers: Spectrofluorimeter, Zirconium, Calcein blue, Chemical interference.

The addition of fluoride to the zirconium-Calcein blue complex results in an enhancement of fluorescence intensity. A method for determination of fluoride based on this fact is described. This method provides a positive fluorimetric method of very high sensitivity for the determination of trace amounts of fluoride in aqueous solution down to 0.001 ppm. Of the common anions, only phosphate interferes seriously at fivefold excesses. Very few cations interfere. A 1:1:1 ternary complex formation is responsible for fluorescence production. The increased fluorescence yield is attributed to conformational stabilization of the excimer of the fluorophore in the ternary complex. The method is rapid and the procedure is reproducible. Analyses show a precision of plus or minus 3 percent near the middle range of calibration curves. (Mortland-Battelle)
W71-11567

SELECTIVE INHIBITION OF CERTAIN ENTERIC BACTERIA BY SELENITE MEDIA INCUBATED AT 35 AND 43 C,
Saskatchewan Univ., Saskatoon. Western Coll. of Veterinary Medicine.
For primary bibliographic entry see Field 05C.
W71-11568

CRITERIA FOR JUDGING ACCEPTABILITY OF ANALYTICAL METHODS,
Food and Drug Administration, Los Angeles, Calif.
Terryl J. Farrell.
Analytical Chemistry, Vol 43, No 1, p 156, January 1971. 1 tab, 5 ref.

Descriptors: *Pesticide residues, Heptachlor, Dieldrin, Aldrin, DDT, Endrin, Gas chromatography, Statistical methods.
Identifiers: DDE, Methoxychlor, DDD, Lindane, BHC.

This correspondence has reference to an earlier paper in Analytical Chemistry (McFarren, Lishka, and Parker, Vol 42, 1970, p 358) in which the authors concluded in part, '...none of the pesticides studied could be determined satisfactorily by gas chromatography'. The impression given was that general pesticide residue GLC analysis was suspect. This correspondence refutes that and presents results from four studies that indicate that pesticide residue GLC methodology is satisfactory, but could be improved. (Mortland-Battelle)
W71-11569

IMPROVED 18-HOUR METHYL RED TEST,
California Univ., Irvine. Coll. of Medicine.
A. L. Barry, K. L. Bernsohn, A. P. Adams, and L. D. Thrupp.
Applied Microbiology, Vol 20, No 6, p 866-870, December 1970. 2 fig, 2 tab, 7 ref.

Descriptors: *Enteric bacteria, *Cultures, *Bioindicators, Biochemistry, Pollutant identification, E. coli.
Identifiers: *Enterobacteriaceae, *Methyl red, Voges Proskauer tests, Klebsiella, Enterobacter cloacae, Enterobacter aerogenes, Enterobacter hafnia, Enterobacter liquefaciens, Agars.

Standard methods for the methyl red (MR) test are not practical for routine use in clinical laboratories because of the necessarily prolonged incubation

period. The present study demonstrates the importance of standardizing the total volume of broth, the size of the vessel in which the cultures are incubated, and the density of the inoculum. In the proposed technique, a single colony was inoculated into a 0.5-ml amount of MR-Voges Proskauer (VP) broth (13- by 100-mm tube), and, after 18 to 24 hr at 37C, one drop of MR was added. With this technique, the broth cultures produced either a definite red (positive) or yellow (negative) color, whereas various shades of orange were frequently observed when larger volumes of broth were tested after only 1 to 2 days of incubation. With 6.0-ml broth cultures, 18-hr MR tests were totally unreliable, but 18-hr tests in 0.5 ml of broth were comparable to the standard MR test performed after 5 days of incubation and superior to those performed after 48 hr in 6.0-ml broth cultures. With the proposed technique, the MR test can be incorporated readily into the routine scheme for identification of Enterobacteriaceae. (Mortland-Battelle)
W71-11570

IDENTIFICATION OF MEMBERS OF THE FAMILY ENTEROBACTERIACEAE BY THER-B SYSTEM,
Mayo Clinic and Foundation, Rochester, Minn. Dept. of Microbiology and Immunology.
William J. Martin, Robert J. Birk, Pauline K. W. Yu, and John A. Washington, II.
Applied Microbiology, Vol 20, No 6, p 880-883, December 1970. 3 tab, 18 ref.

Descriptors: *Enteric bacteria, *Cultures, Salmonella, Pollutant identification, E. coli, Shigella.
Identifiers: Shigella flexneri, Salmonella sonnei, Edwardsiella tarda, Salmonella typhi, Salmonella choleraesuis, Salmonella enteritidis, Arizona hinshawii, Citrobacter freundii, Klebsiella pneumoniae, Klebsiella rhinoscleromatis, Enterobacter cloacae, Enterobacter aerogenes, Enterobacter hafniae, Enterobacter liquefaciens, Serratia marcescens, Pectobacterium carotovorum, Proteus vulgaris, Proteus mirabilis, Proteus morganii, Proteus rettgeri, Providencia alcalifaciens, Providencia stuartii, Aeromonas hydrophilia, Aeromonas shigelloides, R-B media, Agars.

A two-tube differential system, designated R-B media, has been made available for the identification of Enterobacteriaceae. The R-B system was evaluated in parallel with conventional bacteriological procedures for the identification of members of the family Enterobacteriaceae by using bacterial strains from a variety of clinical specimens and from stock cultures. The R-B tests found to be reliable were, in decreasing order, the reactions for phenylalanine deaminase, hydrogen sulfide, and indole, the production of gas from glucose, and the decarboxylation or ornithine. The reactions in the R-B system found to be unreliable were motility, the decarboxylation of lysine, and the fermentation of both glucose and lactose. In addition, the reactions of the R-B system were more difficult to read and interpret than those of the conventional system. On the basis of this evaluation, it was concluded that the R-B system is not an acceptable alternative to the conventional methods in the identification of the Enterbacteriaceae. (Mortland-Battelle)
W71-11571

ONE-DAY FLUORESCENT-ANTIBODY PROCEDURE FOR DETECTING SALMONELLAE IN FROZEN AND DRIED FOODS,
Wisconsin Univ., Madison. Dept. of Microbiology.
J. M. Goepfert, M. E. Mann, and R. Hicks.
Applied Microbiology, Vol 20, No 6, p 977-983, December 1970. 1 fig, 1 tab, 20 ref.

Descriptors: *Salmonella, *Foods, *Fluorescence, Analytical techniques.
Identifiers: Fluorescent-antibody technique, Bacillus sp.

The indirect fluorescent-antibody technique was used to examine 422 food samples for the presence of salmonellae. A cultural phase involving a 16-hr preenrichment in buffered nutrient broth-milk medium followed by a 4- to 5-hr subculture into fresh medium of the same composition was evaluated. This procedure yielded a sufficient population of salmonellae so that no false-negative results were obtained. Of the 31 false-positives obtained, 12 samples yielded positive cultural results upon extensive subculture of the original enrichment broths. Yeast cells and both vegetative and spore forms of bacilli were observed to fluoresce when stained with anti-Salmonella serum. Efforts to ascertain the cause of these cross-reactions and several alternate explanations are discussed. (McCann-Battelle)
W71-11572

METHOD FOR THE ISOLATION OF PROTEOLYTIC MARINE BACTERIA,
South Carolina Univ., Columbia, Belle W. Baruch Coastal Research Inst.
Ronald K. Sizemore, and L. H. Stevenson.
Applied Microbiology, Vol 20, No 6, p 991-992, December 1970. 1 fig, 5 ref.

Descriptors: *Marine bacteria, *Cultures, *Seawater, *Separation techniques, Proteins, Nutrients, Cation, Pollutant identification, Isolation.
Identifiers: Proteolytic bacteria, Casein, Agars.

A double-layer plate technique for isolating proteolytic marine bacteria from seawater is described. The bottom layer contains the protein substrate (2 percent non-fat dry milk and 1.5 percent agar in distilled water) and the bacteria are grown on the top layer of Marine Agar 2216 (Difco). The milk layer is poured first and allowed to solidify before the seawater-agar-nutrient layer is added. The plate can be spot inoculated to test stock cultures for protein degrading ability or used directly for the primary isolation of proteolytic bacteria from marine samples. The technique offers several advantages. Assay of bacteria from marine environments for protein-degrading ability can be done on full-strength seawater media. A readily available protein is used, providing detectable results without the addition of chemical indicators. The plates can be prepared in the laboratory and used without difficulty under field conditions. Since the composition of the upper layer can be altered without disturbing the homogeneity of the milk-agar, various media can be compared for their effect on proteolytic activity. (McCann-Battelle)
W71-11573

INTERLABORATORY COMPARISON OF ANALYSIS OF TRITIUM IN NATURAL WATERS,
International Atomic Energy Agency, Vienna (Austria).
T. Florkowski, B. R. Payne, and G. Sauzay.
International Journal of Applied Radiation and Isotopes, Vol 21, No 8, p 453-458, August 1970. 1 fig, 4 tab.

Descriptors: *Tritium, *Pollutant identification, *Analytical techniques, Statistical methods, Quality control.
Identifiers: *Liquid scintillation counting, *Gas counting, Collaborative studies.

The International Atomic Energy Agency recently compared results of analyses of tritium in natural water. The aim was to enable the increasing number of laboratories in various countries to compare their results with others and to evaluate possible systematic errors due to calibration of the instruments or the procedure used. Three water samples (prepared by spiking tritium-free water) in a tritium concentration range of 10-250 T.U., were distributed to 38 laboratories. The aim of the evaluation was the calculation of mean values for the three spiked samples distributed to each of the 35 laboratories so that the optimal method of assaying could be chosen. The conclusions regarding the optimal concentration range for each method of assay were: (1) Enrichment and gas counting is most accurate in the concentration range from 0 to 80 T.U. For a higher concentration range, direct gas counting is more accurate. (2) For concentrations higher than about 300 T.U., the accuracy of scintillation and gas counting of enriched samples appears to be about the same. (Mortland-Battelle)
W71-11574

CONTRIBUTION TO THE MASS-SPECTROMETRIC IDENTIFICATION WITH COMPUTERS (Beitrag zur Massenspektrometerischen Identifizerung mit Computern),
Karlsruhe Univ. (West Germany). Institut fuer Gastechnik, Feuerungstechnik und Wasserchemie.
For primary bibliographic entry see Field 02K.
W71-11575

DETERMINATION OF BICARBONATE IN WATER IN PRESENCE OF ANIONS OF OTHER WEAK ACIDS (Hydrogenear bonat-Bestimmung um Wasser in Anwesenheit von Anionen anderor Schwacher Sauron),
Munich Univ. (West Germany). Institut fuer Wasserchemie und Chemische Balneologie.
For primary bibliographic entry see Field 02K.
W71-11576

DETERMINATION OF TRACE ELEMENTS IN SERUM AND URINE WITH FLAMELESS ATOMIZATION (Bestimmung von Spuronelementen in Serum und Urin mit flammenloser Atomisierung),
Perkin-Elmer and Co., G.m.b.H., Bodenseewerke, Ueberlingen (West Germany).
B. Welz, and E. Wiedeking.
Zeitschrift fur Analytische Chemie, Vol 252, Nos 2/3, p 111-117, 1970. 3 fig, 2 tab, 8 ref.

Descriptors: *Trace elements, *Urine, *Spectroscopy, Copper, Colorimetry, Analytical techniques, Heavy metals.
Identifiers: *Biological samples, Atomic absorption, Graphite tube furnace, Blood.

A graphite tube furnace for flameless Atomic Absorption Spectroscopy and its application in the analysis of biological materials is described. The values obtained for copper in 12 sera are in good agreement with colorimetric results and Flame-AAS. The sample volume needed for one determination is only 2 micro 1 of serum. Several further application possibilities for the determination of trace elements and for smallest sample volumes are discussed. (McCann-Battelle)
W71-11577

SPECIFIC-ION ELECTRODE DETERMINATION OF NITRATE IN SOME FRESHWATERS AND SEWAGE EFFLUENTS,
Pennsylvania State Univ., University Park. Dept. of Geochemistry and Mineralogy.
Donald Langmuir, and Roger L. Jacobson.
Environmental Science and Technology, Vol 4, No 10, p 834-838, October 1970. 2 fig, 3 tab, 6 ref.

Descriptors: *Nitrates, *Sewage effluents, *Pollutant identification, Analytical techniques, Electrochemistry, Electrodes, Membrane processes, Electrical conductance, Carbonates, Chlorides, Ions.
Identifiers: *Brucine method, Chemical interference.

Thirty-seven waters with 1.5 to 122 p.p.m. NO sub 3- were analyzed for NO sub 3- with a nitrate ion selective electrode and by the brucine method. Two electrode methods were evaluated. The K-gamma method involves making corrections for HCO sub 3- and Cl- and for the effect of ionic strength on Gamma NO sub 3. Cl- has a selectivity ratio of about 3 X 10-2, thus five times more serious an interference than previously reported. Gamma NO sub 3 is evaluated graphically from the specific conductance and the sample's prevalent chemical character. Agreement between the K-

gamma and brucine methods was generally within 1 p.p.m. at all NO sub 3- concentrations. An 'approximate' electrode method, gave results similar to brucine values for samples above 50 p.p.m. of NO sub -3, but was not reliable below that value. Advantages of the electrode over the brucine method are: measurements are generally unaffected by sample color or turbidity; NO sub 3concentrations of 1 to about 6000 p.p.m. may be determined without sample dilution or concentration; the method is rapid and portable; procedures are simple but yield accuracy comparable to that of the brucine method; and reproducibility of measurements with the nitrate electrode is often better than plus or minus 1 percent. (Mortland-Battelle)
W71-11578

THE ISOLATION OF VIRUSES FROM SEWAGE AND TREATED SEWAGE EFFLUENTS,
Council for Scientific and Industrial Research , Pretoria (South Africa). National Inst. for Water Research.
E. M. Nupen.
Water Pollution Control, Vol. 69, No. 4, p 430-435, 1970. 1 tab, 31 ref.

Descriptors: *Water pollution sources, *Water pollution treatment, *Water pollution control, *Viruses, *Public health, *Sewage treatment, *Potable water, Water pollution effects, Diseases, Epidemiology, Sewage, Activated carbon, Environmental sanitation, Settling basins, Flocculation, Analytical techniques, Activated sludge, Filtration, Separation techniques, Water purification, Domestic wastes, Sewage lagoons, Waste water treatment, Filters.
Identifiers: Virus removal, Viral diseases.

The importance of viruses as transmitters of disease in sewage, sewage effluents and drinking water has been strongly debated. Such debate is promoted by the lack of suitable techniques for the determination of viruses in suspect water. It is emphasized that any viruses in water are important because of the possible widespread low level transmission of infection and not necessarily because of explosive outbreaks of diseases. The origins, isolation techniques and treatment techniques for viruses are discussed. (LeGore - Washington)
W71-11580

THE FLAGFISH, JORDANELLA FLORIDAE, AS A LABORATORY ANIMAL FOR BEHAVIORAL BIOASSAY STUDIES,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology.
For primary bibliographic entry see Field 05C.
W71-11581

RAPID MICRODETECTION OF ORGANOCHLORINE PESTICIDES IN SUBMILLIGRAM FISH TISSUE SAMPLES,
Miami Univ., Fla. Inst. of Marine Sciences.
Douglas B. Seba, and Charles E. Lane.
Bulletin of Environmental Contamination and Toxicology, Vol 4, No 5, p 297-305, 1969. 1 fig, 8 ref.
FWPCA Grant No. DI WP 01325-01.

Descriptors: *Gas chromatography, *Chlorinated hydrocarbon pesticides, *Pollutant identification, *Pesticide residues, Analytical techniques, Bioassay, Water pollution, Fish physiology, Agricultural chemicals, Path of pollutants.
Identifiers: *Pesticide assay, *Pesticide analysis, Tissue analysis.

An apparently rapid and accurate method is reported of determining sub-ppm concentrations of organochlorine pesticides in submilligram amounts of fish tissue. Samples of fish gill, brain, blood, liver, gall bladder, intestine and muscle have been routinely analyzed with good results. Recovery of added pesticide from tissues is virtually 100%, with precision increasing from plus or minus20% for 0.1 mg samples to plus or minus 5% for 25 mg or larger samples. The use of saponification makes this method applicable to most organochlorine pesticides. The samples can be stored indefinitely in sealed capillaries, enabling efficient scheduling of gas chromatography facilities. (LeGore - Washington)
W71-11599

5B. Sources of Pollution

DRAINAGE AND POLLUTION FROM BEEF CATTLE FEEDLOTS,
Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
Raymond C. Loehr.
Journal of the Sanitary Engineering Division, ASCE, Vol 96, No SA6, p 1295-1309, 1970. 4 fig, 1 tab, 26 ref.

Descriptors: *Drainage, *Water pollution, *Cattle, Runoff, Groundwater, Nutrients, Biochemical oxygen demand, Rainfall, Chlorides, Nitrogen, Ammonia, Phosphates, Chemical oxygen demand, Acids, Water pollution sources, Water pollution effects, Bacteria, Retention, Waste disposal, Management, Water pollution control.
Identifiers: *Feedlots, Animal production, Cattle wastes, Volatile acids, Land application.

The specialization of the livestock production industry established the trend of confinement feeding and increasing animals per feeding operation. Uncontrolled waste discharges from these operations are a source of water pollution by excessive nutrients, microorganisms impairing recreation waters, impurities in groundwater, contaminants that complicate water treatment, and dissolved oxygen depletion causing fish kills. Runoff from concrete surfaced feedlots contains higher organic matter and nitrogen concentrations than runoff from unsurfaced. Groundwater contamination from nitrates is significant during and after the lot life. Absorption of ammonia volatilized from cattle feedlots can contribute to nitrogen enrichment of surface waters in their vicinity. In the midwest and southwest, retention ponds with controlled discharge and retention-evaporation ponds can provide satisfactory control and treatment. Approved facilities in Kansas include runoff diversion, retention ponds for all waste water and runoff contacting animal wastes and application of both liquid and solid wastes to agricultural land. Enclosed housing beef cattle production will minimize contamination of runoff and avoid runoff pollution problems. (Jones-Wisconsin)
W71-10994

D-X SUNRAY OIL CO V BILLUE (OIL POLLUTION OF UNDERGROUND WATER SUPPLY).
For primary bibliographic entry see Field 06E.
W71-11000

POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES,
Kramer, Chin and Mayo, Seattle, Wash.
For primary bibliographic entry see Field 05C.
W71-11006

DREDGING: PROBLEMS AND REMEDIES,
Corps of Engineers, Buffalo, N.Y.
For primary bibliographic entry see Field 05C.
W71-11035

DETERMINATION OF MERCURY IN BIOLOGICAL AND ENVIRONMENTAL SAMPLES BY NEUTRON ACTIVATION ANALYSIS,
Western New York Nuclear Research Center, Inc., Buffalo.
K. K. Sivasankara Pillay, Charles C. Thomas, Jr., James A. Sondel, and Carolyn M. Hyche.
Tpyescript; Presented at 161st National Meeting of the American Chemical Society at Los Angeles, California, March 31, 1971.

Descriptors: *Sampling, *Environment, *Neutron activation analysis, Radioactivity, Adsorption, Fish, Lake Erie, Sediments, Silts, Plankton, Algae, Trace elements, Volatility, Freeze drying, X-rays, Electrolysis, Computer programs, Gamma rays, Pollutant identification, Colorimetry, Tracers.
Identifiers: *Mercury, *Biological tissues, Mercury isotopes, Human brain, Low-temperature oven drying, Ashing, Extractive digestion, Neuroanatomy, Oxygen plasma ashing, Atomic absorption, Titration.

The minute quantities and volatile nature of mercury creates problems in sampling and analysis. Of various mercury determination procedures, only a limited number can be readily adapted to biological and environmental sampling for monitoring. The following procedures were developed for the investigation of the mercury pollution of Lake Erie and its aquatic life. Pre-irradiation processing of samples has been systematically investigated. After reactor irradiation, the samples are wet ashed with mercury carrier under reflux conditions. A preliminary sulfide precipitation is followed by further purification and eventual isolation of mercury by electrodeposition or by precipitation as mercuric oxide. The radioactivities from mercury-197 and mercury-197-m isotopes are measured by scintillation gamma ray spectrometry using a thin sodium iodide detector to determine the mercury levels in various samples. These analytical procedure results are compared with other techniques. Tracer studies indicated that the errors of this procedure were less than 15% at 0.01 ppm level and less than 5% at 2 ppm level of mercury in biological tissues. Analysis of fish samples and sediments samples containing natural forms of mercury showed a standard deviation of less than 5% at 5 ppm levels, less than 7% at 1.5 ppm levels and less than 17% at 0.01 ppm levels. (Jones-Wisconsin)
W71-11036

CRITICS WEIGH EPA HERBICIDE REPORT, FIND IT WANTING,
For primary bibliographic entry see Field 05C.
W71-11037

OIL SPILL TECHNOLOGY MAKES STRIDES,
American Chemical Society, Washington, D.C.
Stanton S. Miller.
Environmental Science and Technology, Vol 5, No 8, p 674-675, August 1971. 2 p, 1 fig.

Descriptors: *Water pollution sources, *Oily water, *Water pollution treatment, Reviews, Methodology, Research and development, Research equipment.
Identifiers: *Oil spills, *Oil spill recoveries.

Design studies have been completed on a number of devices for removing oil spills. But additional funds now are needed for prototype development of these devices, followed by later field tests. Many of these devices will be scaled and will undergo field tests in the near future. Such devices, for example, include: (1) A floating weir skimmer device--Esso Ltd., (2) Free vortex recovery system--Scientific Associates, Inc., (3) Oleophilic belt scrubber--Shell Pine Line Corp., (4) Rotating disk oil-removal system--Atlantic Research Systems Div., and (5) Rotating disk removal device--Lockheed. The Lockheed device will be scaled to a device 8 ft in diameter and 10 ft wide. It will have a recovery capacity of 1500 gal of oil per minute, will be installed on a catamaran, and tested in West Coast field trials later this year.
W71-11066

MODEL ECOSYSTEM FOR THE EVALUATION OF PESTICIDE BIODEGRADABILITY AND ECOLOGICAL MAGNIFICATION,
Illinois Univ., Urbana. Dept. of Zoology; and Illinois Univ., Urbana. Dept. of Entomology.
Robert L. Metcalf, Gurcharan K. Sangha, and Inder P. Kapoor.
Environmental Science and Technology, Vol 5, No 8, p 709-713, August 1971. 5 p, 2fig, 3 tab, 12 ref.

Descriptors: *Water pollution sources, *Pesticides, *Biodegradation, *Ecosystems, Model studies, Laboratory tests, Analytical techniques, Evaluation.
Identifiers: *Radiolabeled insecticides.

A small laboratory model ecosystem was developed to study the biodegradability of pesticides, and evaluated with radiolabeled DDT, DDE, DDD, and methoxychlor. The model ecosystem has a terrestrial-aquatic interface and a seven-element food chain. It simulates the application of pesticides to crop plants and the eventual contamination of the aquatic environment. Radiolabeled DDT was accumulated in mosquito larvae, snails, and fish as DDE, DDD, AND DDT and concentrated from 10,000- to 100,000-fold. C-14 DDE was concentrated 30,000- to 50,000-fold and stored with little metabolism, while H-3 methoxychlor was readily metabolized to mono- and di-OH derivatives and was stored at comparatively low levels. The model ecosystem approach has considerable value for studying the biodegradability and ecological fate not only of new candidate pesticides, but also of industrial chemicals.
W71-11067

RADIOACTIVE WASTE DISCHARGES TO THE ENVIRONMENT FROM A NUCLEAR FUEL REPROCESSING PLANT,
Environmental Protection Agency, Washington, D.C.; and Bureau of Radiological Health, Rockville, Md.
Joe E. Logsdon, and John W. N. Hickey.
Radiological Health Data and Reports, Vol 12, No 6, p 305-312, June 1971. 8 p, 3 fig, 4 tab, 11 ref.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, *Path of pollutants, *Public health, *Radioactive wastes, Waste disposal, Safety, Radioactivity, Tritium, Cesium, Radioisotopes, Cobalt radioisotopes, Pollutant identification, New York.
Identifiers: Nuclear fuel reprocessing.

A nuclear fuel reprocessing plant in operation in New York since 1966 has provided valuable experience in nuclear waste management problems. The large quantities of radioactivity which must be controlled at a nuclear fuel reprocessing plant eliminate discharge-and-dilution as a satisfactory method of disposing of radionuclides which concentrate through environmental media. Radionuclides such as strontium-90, ruthenium-106, cesium-137, cesium-134, cobalt-60, tritium, and krypton-85 are found in the vicinity of the facility. These indicate that pathways to the public do exist as a result of operations of the facility. However, studies to data show that typical population doses in the vicinity of NFS are not significantly different from doses received in other portions of the State.
W71-11074

MERCURY IN WATER OF THE TIDAL THAMES,
Institute of Geological Sciences, London (England). Geochemical Div.
For primary bibliographic entry see Field 05A.
W71-11083

SAMPLING AND MEASUREMENT IN THE AQUATIC ENVIRONMENT,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 05A.
W71-11084

THE ENHANCEMENT OF VIRAL INACTIVATION BY HALOGENS,
Johns Hopkins School of Hygiene and Public Health, Baltimore, Md. Dept. of Environmental Health.
C. W. Kruse, V. P. Olivieri, and K. Kawata.
Water and Sewage Works, Vol 118, No 6, p 187-193, June 1971. 7 p, 6 fig, 1 tab, 11 ref.

Descriptors: *Water pollution sources, *Water treatment, *Halogens, *Waste treatment, Industrial wastes, Municipal wastes, Fertilizers, Nutrients, Coliforms, Surface waters, Watershed management, Water supply.

The conservation of water supply, shellfishing and water contact sports for the growing population calls for the improvement in the degree of treatment of industrial and domestic waste discharges. In every instance the removal of human pathogens must be intensified. The federal guidelines, under the National Environmental Policy Act of 1969, suggest that discharges to shellfish, potable and recreational water should be avoided. Where such discharges are unavoidable, many precautions must be taken including dual chlorination units, automatic regulation and recording of chlorine residuals, automatic emergency alarm systems, and sand filters or polishing ponds following secondary treatment. Anyone familiar with current small wastewater treatment systems knows that the execution of some of these provisions is unlikely.
W71-11085

TURBIDITY PENETRATION IN INFILTRATION GALLERIES,
Zimmerman, Evans and Leopold, Augusta, Ga.
J. N. Ramaswamy.
Water and Sewage Works, Vol 118, No 6, p 194-196, June 1971. 3 p, 4 fig, 2 tab, 13 ref.

Descriptors: *Turbidity, *Infiltration, *Water pollution, Sands, Particle size, Test procedures, Model studies, Forecasting, Pumping.
Identifiers: *Turbidity penetration, *Infiltration galleries.

Studies were made on turbidity penetration in infiltration galleries. The information on physical aspects, such as effects of pumping rate, sand size and influent turbidity, would aid in proper design in infiltration galleries. Six asbestos cement pipes, each 2.5 inches in diam and 16 ft long, were filled with sand to a depth of 12 ft and vertically supported by wooden planks to serve as test beds. Sand of effective sizes 0.2 mm, 0.3 mm and 0.4 mm with uniformity coefficient of 1.5 and 2.0 in each were used. The depth of water over the sand bed was kept constant at 4 ft by adjusting the screw pinchcock of the influent and effluent tubes. Influent water with artificial turbidity of 25, 50 and 100 mg/liter was applied to the test sand beds at rates of 0.1, 0.2, 0.4, 0.6 and 0.8 gpm/sq ft. Samples were collected from the sampling points and analyzed for turbidity using a Hellige turbidimeter. Depth of penetration of turbidity in infiltration galleries is directly proportional to amount of influent turbidity, rate of pumping, and size of particle; it is inversely proportional to uniformity coefficient of the particle. Rate of pumping has the greatest influence on turbidity penetration.
W71-11087

RADIOCHEMICAL ANALYSES OF WATER SAMPLES FROM SELECTED STREAMS AND PRECIPITATION COLLECTED OCTOBER 23-NOVEMBER 9, 1970, IN CONJUNCTION WITH THE FIRST PRODUCTION-TEST FLARING OF GAS FROM TEST WELL, PROJECT RULISON,
Geological Survey, Denver, Colo.
Hans C. Claassen.
Report available from Nat. Tech. Inf. Service, Springfield, Va. 22151-price $3.00 printed copy; 95 cents microfiche. Geological Survey Report USGS-474-108 (AEC), 1971. 10 p, 1 fig, 2 tab, 3 ref. Agreement No AT (29-2)-474 USAEC.

Descriptors: *Nuclear explosions, *Oil fields, *Natural gas, *Monitoring, *Water pollution sources, Radioisotopes, Sampling, Tritium, Deuterium, Colorado.
Identifiers: *Project Rulison (Colo).

The U.S. Geological Survey established a water-sampling network in central and western Colorado to sample the hydrologic environment prior to, during, and following the various phases of Project Rulison. This report presents data from samples collected from August 15, 1970 through October 13, 1970, monitoring the Rulison test, in the gas-production calibration and flaring phase of the project. The period of time covered by this report was one of very low tritium values in precipitation. The stream samples are a little higher in tritium, reflecting more nearly the average, long-term tritium background. Gross alpha and beta values for the dissolved constituents show little variation, as do the tritium values. There is greater variation in the gross alpha and beta values for the suspended portion of the sample. (Knapp-USGS)
W71-11135

RADIOCHEMICAL ANALYSES OF WATER SAMPLES FROM SELECTED STREAMS AND PRECIPITATION COLLECTED IN CONNECTION WITH CALIBRATION-TEST FLARING OF GAS FROM TEST WELL, AUGUST 15-OCTOBER 13, 1970. PROJECT RULISON,
Geological Survey, Denver, Colo.
Hans C. Claassen, and Paul T. Voegeli, Sr.
Report available from Nat. Tech. Inf. Service, Springfield, Va. 22151 - price $3.00 printed copy; 95 cents microfiche. Geological Survey Report USGS-474-107 (AEC), 1971. 10 p, 1 fig, 2 tab, 2 ref. Agreement No AT (29-2)-474 USAEC.

Descriptors: *Nuclear explosions, *Oil fields, *Natural gas, *Monitoring, *Water pollution sources, Radioisotopes, Sampling, Tritium, Deuterium, Colorado.
Identifiers: *Project Rulison (Colo).

The U.S. Geological Survey established a water-sampling network in central and western Colorado to sample the hydrologic environment prior to, during, and following the various phases of Project Rulison. This report presents data from samples collected from August 15, 1970 through October 13, 1970, monitoring the Rulison test, in the gas-production calibration and flaring phase of the project. The period of time covered by this report was one of very low tritium values in precipitation. The stream samples are a little higher in tritium, reflecting more nearly the average, long-term tritium background. Gross alpha and beta values for the dissolved constituents show little variation, as do the tritium values. There is greater variation in the gross alpha and beta values for the suspended portion of the sample. (Knapp-USGS)
W71-11137

POLLUTION OF THE SEAS: OIL POLLUTION.
For primary bibliographic entry see Field 06E.
W71-11179

A BILL TO AMEND SECTION 4 OF THE ACT OF MARCH 3, 1965, TO PROHIBIT THE DUMPING OF CERTAIN SPOIL INTO THE GREAT LAKES.
For primary bibliographic entry see Field 06E.
W71-11184

A BILL TO PROHIBIT THE DISCHARGE INTO ANY OF THE NAVIGABLE WATERS OF THE UNITED STATES OR INTO INTERNATIONAL WATERS OF ANY MILITARY MATERIAL OR OTHER REFUSE WITHOUT A CERTIFICATION BY THE ENVIRONMENTAL PROTECTION AGENCY APPROVING SUCH DISCHARGE.
For primary bibliographic entry see Field 06E.
W71-11186

THE MERCURY POLLUTION CONTROL ACT (A BILL).
For primary bibliographic entry see Field 06E.
W71-11190

THE OCCURRENCE OF SEWAGE FUNGUS IN RIVERS IN THE UNITED KINGDOM,
Water Pollution Research Lab., Stevenage (England).
E. J. C. Curtis, and D. W. Harrington.
Water Research, Vol 5, No 6, p 281-290, June 1971. 10 p, 3 fig, 5 tab, 14 ref.

Descriptors: *Water pollution effects, *Water pollution control, *Fungi, *Sewage treatment, Tertiary treatment, Biodegradation, Water pollution sources, Biochemical oxygen demand, Biological treatment.
Identifiers: *Sewage fungus, *United Kingdom.

Sewage-fungus outbreaks are associated with the presence of biodegradable organic matter in water and thus with effluents which discharge such materials. Outbreaks in the United Kingdom are mostly of limited extent except where a river has received a succession of polluting effluents. Of the sanitary measurements at present in use BOD and soluble organic carbon provide the most reliable guide to the slime-promoting properties of a water, but they are not infallible since heavy slime outbreaks can be associated with low BOD values and vice versa. Possible reasons for this would include the differing rates at which various biodegradable substances can be utilized and the presence or absence of inhibitors and poisons. Where slime outbreaks are associated with waters of low BOD or organic carbon content the presence of rapidly biodegradable materials not normally present in a good quality sewage effluent (for example, sugars) has often been noted. Adequate secondary biological treatment of an effluent seems in most cases to provide a reliable safeguard against slime outbreaks, but where this is insufficient such treatment followed by a tertiary 'polishing' process is likely to be effective. (Knapp-USGS)
W71-11210

THE DISPERSION OF A DECAYING EFFLUENT DISCHARGED CONTINUOUSLY INTO A UNIFORMLY FLOWING STREAM,
New Brunswick Univ., Fredericton. Dept. of Chemical Engineering.
D. M. Ruthven.
Water Research, Vol 5, No 6, p 343-352, June 1971. 10 p, 1 tab, 12 ref, append.

Descriptors: *Dispersion, *Mixing, *Path of pollutants, *Diffusion, *Biochemical oxygen demand, Open channel flow, Movement, Waste assimilative capacity, Water pollution sources.

The distribution of a decaying effluent, discharged continuously from a point source into a uniformly flowing stream, is discussed in terms of the diffusion equation which is reduced, by suitable approximations to a two dimensional partial differential equation. The solution of this equation is presented and used to assess the effect of transverse mixing on the B.O.D. profile for such a system. An expression is derived for the mixing length (the downstream distance which is required to ensure an approximately uniform concentration of effluent across the river section). Equations are developed to express the conditions under which the effects of both longitudinal and transverse mixing are negligible and the simple plug flow model is an acceptable approximation. (Knapp-USGS)
W71-11213

POLLUTION DETECTION BY REMOTE SENSING,
American Chemical Society, Washington, D.C.
For primary bibliographic entry see Field 05A.
W71-11220

ACCUMULATION OF DDT BY DAPHNIA MAGNA,
California Univ., Davis. Dept. of Environmental Toxicology.
Donald G. Crosby, and Richard K. Tucker.
Environmental Science and Technology, Vol 5, No 8, p 714-716, August 1971. 3 p, 1 fig, 3 tab, 12 ref.

Descriptors: *Water pollution effects, *DDT, *Insecticides, *Water pollution sources, *Daphnia, Aquatic life, Analytical techniques, Laboratory tests, Absorption.
Identifiers: *Daphnia magna, Aquatic food chain.

Daphnia magna, an important link in the aquatic food chain, accumulates the insecticide DDT in 16,000 to 23,000-fold quantities from dilute suspension in water within 24 hr. Uptake is principally through the carapace and initially is rapid. Final body levels may reach several thousand milligrams per kilogram. Approximately 25% of the added DDT remained unaccountable. Although mechanical errors, incomplete extraction, and metabolic decomposition undoubtedly contributed, the greatest loss appeared to be due to the evaporative codistillation of DDT with water. About 20% of a control DDT suspension disappeared on standing at room temperature overnight, although a volume change of only 6 ml (or 25%) was observed. Consequently, the initial concentration of 8 ppb was reduced to 6 ppb by the end of a 24-hour test unless precautions were taken to minimize volatilization. (Woodard-USGS)
W71-11221

ORGANIC MATTER IN NATURAL WATERS--A SYMPOSIUM.
Alaska Univ., College. Inst. of Marine Science.

Available from Inst. of Marine Science, Univ. of Alaska, College, Alaska 99701. Price $8.00. Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, June 1970. 625 p.

Descriptors: *Conferences, *Organic matter, *Sea water, *Surface waters, *Groundwater, Nutrients, Path of pollutants, Cycling nutrients, Nitrogen cycle, Carbon cycle, Water pollution effects, Pollutant identification, Water analysis, Water chemistry.

Information concerning the importance of organic matter in natural waters is limited and scattered. Nevertheless, there is a large amount of information pointing directly to the significance of these minor organic components in the complex chemistry of the sea. This symposium was held to organize and summarize present knowledge of the subject. The association of organics with sediment during metamorphosis and diagenesis into sedimentary rocks has been found to be involved in both the origin and migration of petroleum. Probably the most difficult and least understood aspect of clay mineralogy concerns relating the sorbed organic matter on clay minerals to the changes in cation exchange properties, physical characteristics and consolidation of these clays in sedimentary materials. The surface tension of natural ocean water is always lower than that of clean water because of organic contamination. An understanding of the stimulus, depression or activity of organisms caused by organic matter hinges on careful, detailed analysis of the constituents present, a determination of their rates of production and degradation, and a determination of their distribution in the ocean. To understand the dynamics of ocean processes and to better use the sea, man must understand the cycle of carbon through the biological, geochemical and physical pathways of the environment. This symposium is a part of the continuing effort to achieve this understanding. (See also W71-11227 thru W71-11249) (Knapp-USGS)
W71-11226

DISTRIBUTION AND CYCLING OF ORGANIC MATTER IN THE OCEANS,
Woods Hole Oceanographic Institution, Mass.
David W. Menzel, and John H. Ryther.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 31-54, June 1970. 24 p, 11 fig, 1 tab, 45 ref. USAEC Contract AT (30-1)-3862 and ONR Contract Nonr CO 241.

Descriptors: *Organic matter, *Sea water, *Distribution patterns, *Food chains, *Cycling nutrients, Dissolved oxygen, Biochemistry, Water chemistry, Salinity, Photosynthesis.
Identifiers: *Organic matter cycle (Oceans).

The vertical distribution of particulate and dissolved organic carbon in the oceans is nearly homogeneous below a depth of 200 to 300 m at all locations sampled, and they are present in concentrations of 3 to 10 micrograms C/liter and 0.35 to 0.70 mg C/liter, respectively. Above this depth concentrations are variable, with particulate matter directly proportional and dissolved carbon inversely proportional to the rate of primary production. Simultaneous consideration of changes in oxygen and salinity in subsurface waters in the absence of variable quantities of organic matter indicates that both oxygen and carbon may be considered conservative properties. The entire biochemical cycle of organic matter including production, decomposition and solubilization appears to occur at depths probably not in excess of 200 to 300 m. (See also W71-11226) (Knapp-USGS)
W71-11227

LIPIDS OF MARINE WATERS,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 05A.
W71-11228

MOLECULAR NATURE OF NITROGENOUS COMPOUNDS IN SEA WATER AND RECENT MARINE SEDIMENTS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
Egon T. Degens.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 77-106, June 1970. 30 p, 7 fig, 5 tab, 35 ref. NASA Project NSR-22-014-001; PRF-1943-A2 (Petroleum Research Fund, ACS).

Descriptors: *Organic matter, *Sea water, *Nitrogen compounds, *Biochemistry, Cycling nutrients, Nutrients, Dissolved oxygen, Mineralogy, Sedimentation, Biodegradation, Carbon, Nitrogen, Distribution patterns, Water chemistry, Nitrates.
Identifiers: *Nitrogenous organic matter.

The molecular composition of nitrogenous organic matter in sea water and sediments is discussed. Proteins and protein-derived metabolites, such as urea and amino acids, account for the bulk of the dissolved org anic matter in the sea; the low C/N ratio with a mean of 2.5 to 3.0 supports this inference. These compounds occur primarily in clathrate-type complexes. The particulate organic matter in surface waters is largely living organisms and in deep waters is intact or partially degraded biogenic material. Detritus and dissolved organic matter in sediments are used for synthesis of proteins by microorganisms and burrowing animals. Polymerization may also be achieved via epitaxial growth on mineral surfaces. In oxidizing environments, nitrogenous compounds are diagenetically degraded rapidly unless they are protected by minerals such as organic clay derivatives or shell carbonates. Strongly reducing environments favor the preservation of organic matter as a consequence of low biological activity. (See also W71-11226) (Knapp-USGS)
W71-11229

DISSOLVED AND PARTICULATE CARBOHYDRATES,
Nagoya Univ. (Japan). Water Research Lab.
For primary bibliographic entry see Field 05A.
W71-11230

DISSOLVED ORGANIC COMPOUNDS IN SEA WATER: SATURATED AND OLEFINIC

HYDROCARBONS AND SINGLY BRANCHED FATTY ACIDS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05A.
W71-11231

VOLATILE ORGANIC MATERIALS IN SEA WATER,
Antioch College, Yellow Springs, Ohio.
For primary bibliographic entry see Field 05A.
W71-11232

CHEMICAL STRUCTURES OF COLOR PRODUCING ORGANIC SUBSTANCES IN WATER,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05A.
W71-11233

DETERMINATION OF MICROBIAL BIOMASS IN DEEP OCEAN WATER,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 05A.
W71-11234

METAL ORGANIC COMPLEXES FORMED BY MARINE BACTERIA,
New Hampshire Univ., Durham. Jackson Estuarine Lab.
Galen E. Jones.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 301-319, June 1970. 19 p, 6 fig, 2 tab, 30 ref. FWPCA Research Grant WP-00650 and ONR Research Contract N-00014-68-C-0269.

Descriptors: *Organic matter, *Sea water, *Bacteria, *Biochemistry, *Water chemistry, Solutes, Pigments, Water pollution sources.
Identifiers: *Metal-organic complexes.

Metal organic complexes are of geochemical and biogeochemical importance in the sea. Trace elements accumulate in various bioliths; thus, crude oil is often rich in Mo, Ni or V and asphalt is rich in Ni. The concentration of trace elements such as Cu, Ni, Co, Cd and other transition elements by plants, animals and bacteria may be a principal mechanism by means of which these elements are concentrated in geological deposits. The formation of organic compounds by marine bacteria may be important during the formation of small particles in the sea, during the formation of ferromanganese nodules, as food for algae, as energy for other bacteria, as growth factors or inhibitory substances for algae, and as metal chelating substances. (See also W71-1226) (Knapp-USGS)
W71-11235

THRESHOLD CONCENTRATIONS OF CARBON SOURCES LIMITING BACTERIAL GROWTH IN SEA WATER,
Woods Hole Oceanographic Institution, Mass.
Holger W. Jannasch.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 321-328, June 1970. 8 p, 2 fig, 1 tab, 7 ref. NSF Grant GB-7747.

Descriptors: *Nutrients, *Organic matter, *Nutrient requirements, *Bacteria, *Sea water, Essential nutrients, Cycling nutrients, Eutrophication, Water chemistry, Carbon, Population, Aquatic populations.
Identifiers: Threshold nutrient concentrations, Carbon compounds.

Growth experiments with marine bacterial isolates in a chemostat reveal the existence of threshold concentrations of some limiting carbon sources (lactate, glucose, glycerol). The phenomenon is explained in terms of the elimination of a positive feedback effect below a critical population density. (See also W71-11226) (Knapp-USGS)
W71-11236

INSTRUMENTAL TECHNIQUES FOR THE IDENTIFICATION OF POLLUTANTS,
Rocketdyne, Canoga Park, Calif. Environmental Sciences and Technology.
For primary bibliographic entry see Field 05A.
W71-11237

AIR TRANSPORT OF ORGANIC CONTAMINANTS TO THE MARINE ENVIRONMENT,
Scripps Institution of Oceanography, La Jolla, Calif.
Edward D. Goldberg.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 351-358, June 1970. 8 p, 1 tab, 14 ref.

Descriptors: *Water pollution sources, *Air pollution, *Fallout, *Industrial wastes, *Path of pollutants, Water chemistry, Winds, Pesticides, Sewage.

The organic effluents of civilization reaching the ocean are attaining input levels comparable to those of the oceanic community. Insight into the materials entering the marine environment may be gained by a survey of the production rates of organic materials and by coupling such information to chemical properties and uses. For example, the widespread utilization of the poly-chlorinated biphenyls in the plastics industry may explain their recently observed occurrences in marine organsims. Acetone in surface sea waters may be linked to its extensive use in the chemical industry and to its volatility. Industrial, social and agricultural activities of society introduce such refractory phases as fly-ash, talc, and glass, solids that rapidly pass through the water column to the sediments. Their importance in altering the overall chemical composition of the oceans may result from their acting as reaction sites for precipitation or oxidation-reduction processes involving the dissolved species in sea water. (See also W71-11226) (Knapp-USGS)
W71-11238

IDENTIFICATION OF ORGANIC MATTER IN POLLUTED WATER,
Federal Water Pollution Control Administration, Cincinnati, Ohio. Water Research Lab.
For primary bibliographic entry see Field 05A.
W71-11239

CARBONATE-ORGANIC INTERACTIONS IN SEA WATER,
Hawaii Univ., Honolulu. Dept. of Oceanography.
K. E. Chave.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 373-385, June 1970. 13 p, 5 fig, 16 ref. ONR Contract N00014-67-A-0387-0002.

Descriptors: *Water chemistry, *Calcium carbonate, *Carbon dioxide, *Sea water, *Organic matter, Chemical reactions, Equilibrium, Chemical precipitation, Sedimentation, Carbonates, Calcium, Magnesium, Mineralogy.
Identifiers: *Carbonate-organic reactions.

Three features of the calcium carbonate-sea water system have puzzled marine geochemists for many years. These features are: The supersaturation of most surface and near-surface sea waters with respect to CaCO3; the complex mineralogy of shelf carbonate sediments; and the occurrence of CaCO3 in pelagic sediments from all depths of the ocean. Each of the three puzzling features of the geochemistry of the carbonate-sea water system -- the evidence for disequilibrium -- can be explained on the basis of regulation of the reactions by surface active organic molecules. (1) Precipitation from highly supersaturated sea water occurs very slowly in the presence of dissolved organics, at sea water pH's. When these organics are removed, at higher pH's, precipitation proceeds rapidly. Precipitation does not take place on pre-existing nuclei because they are coated with organics. (2) Complex mineralogy of shallow sediments is explained by organic coatings on mineral grains which prevent contact between the mineral and the water. (3) Occurrence of carbonates in the deep sea is explained by the resistance of organic coatings to acid attack. (See also W71-11226) (Knapp-USGS)
W71-11240

ORGANIC CHELATION OF Co-60 AND Zn-65 BY LEUCINE IN RELATION TO SORPTION BY SEDIMENTS,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.
For primary bibliographic entry see Field 02K.
W71-11241

THE ENHANCED PRESERVATION OF ORGANIC MATTER IN ANOXIC MARINE ENVIRONMENTS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W71-11242

INFLUENCE OF ORGANIC MATTER ON INORGANIC PRECIPITATION,
Nagoya Univ. (Japan). Water Research Lab.
For primary bibliographic entry see Field 02K.
W71-11243

LOW MOLECULAR WEIGHT HYDROCARBONS AND CARBON MONOXIDE IN SEA WATER,
Naval Research Lab., Washington, D.C.
V. J. Linnenbom, and J. W. Swinnerton.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 455-467, June 1970. 13 p, 7 fig, 6 ref.

Descriptors: *Sea water, *Hydrocarbons, *Water chemistry, Water analysis, Sampling, Biochemistry, Organic matter, Water temperature, Gas chromatography, Water pollution sources.
Identifiers: *Carbon monoxide.

Some recent work on trace amounts of dissolved gases in sea water is reviewed. Surface concentrations of hydrocarbons appear to be similar in different areas. Methane has about the value one would expect on the basis of its partial pressure in the atmosphere. In the upper layer (0 to 200 m) pronounced concentration peaks exist with the olefins generally higher in concentration than their saturated homologues. This non-homogeneous distribution suggests the existence of processes occurring at rates faster than physical mixing rates. In oxygenated waters concentrations generally tend to decrease with depth, but in anoxic areas the situation is reversed, with methane increasing 3 to 4 orders of magnitude and ethane approximately 2 orders. The ocean, bays and rivers may be a source of carbon monoxide, with the transport of gas being from the water to the atmosphere. Various algae, green plants and some species of siphonopores produce carbon monoxide. Apparently concentrations of carbon monoxide found in the water are not caused by manmade pollution, contrary to what seems to be the case for methane, since the highest values found for dissolved carbon monoxide were observed in the open ocean. Rather than acting as a sink for atmospheric carbon monoxide, the sea appears to be a source. (See also W71-11226) (Knapp-USGS)

W71-11244

ORGANIC CHEMISTRY OF NATURAL SEA SURFACE FILMS,
Naval Research Lab., Washington, D.C.
W. D. Garrett.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 469-477, June 1970. 9 p, 2 fig, 1 tab, 11 ref.

Descriptors: *Films, *Sea water, *Oily water, *Monomolecular films, *Lipids, *Alcohols, Thin films, Organic matter, Chemical reactions, Water chemistry.
Identifiers: *Sea-surface films, Slicks.

Sea surface films are mono-molecular since only the polar molecules directly attached to the air/sea interface can reduce its surface free energy and alter its physical properties. Furthermore, film pressures measured in natural sea slicks are almost always less than the collapse pressures of lipid or protein monolayers. Thus, sea surface films are not usually compressed by convergent forces to the point where they are forced into a multilayered structure. Lipids, proteins, phosphorous-containing compounds and possibly carbohydrates are available at the sea surface to contribute to film formation. The most important and durable compounds at the air/water interface are the lipids of high molecular weight. For example, a fatty acid or glyceride fatty ester would be highly polar and water insoluble. (See also W71-11226) (Knapp-USGS)
W71-11245

CONDITIONAL STABILITY CONSTANTS OF A NORTH CAROLINA SOIL FULVIC ACID WITH Co (2..) AND Fe (3..),
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02G.
W71-11246

TRANSITION METAL BINDING BY LARGE MOLECULES IN HIGH LATITUDE WATERS,
Alaska Univ., College. Inst. of Marine Science.
Robert J. Barsdate.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 485-493, June 1970. 9 p, 1 fig, 3 tab, 7 ref. USAEC Contract AT (04-3)310 PA4, NSF Grant GB 8274.

Descriptors: *Trace elements, *Surface waters, *Organic matter, *Copper, *Chelation, Analytical techniques, Sampling, Water pollution sources.
Identifiers: Zinc.

A substantial portion of the zinc from productive inshore waters is unreactive to concentration by a diathizime technique. Fractions of the trace metals manganese, copper and zinc from ocean water are retained in dialysis bags when exhaustively dialyzed against tridistilled water. This material is not extractable with ordinary chelating reagents, which react with the divalent forms of these elements, but is readily retractable when oxidized with persulfuric acid prior to the extraction process. Samples were taken from Unimak Pass, where water from the Gulf of Alaska is moving into the Bering, and from a station a short distance to the northeast in the Bering in an area of high primary productivity associated with the upwelling and mixing along the passes between the Aleutians. Very little of the large exchangeable complexes detected by this technique were found. (See also W71-11226) (Knapp-USGS)
W71-11247

MICRODETERMINATION OF URONIC ACIDS AND RELATED COMPOUNDS IN THE MARINE ENVIRONMENT,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.

For primary bibliographic entry see Field 05A.
W71-11248

WHAT YOU DON'T KNOW CAN HURT YOU: ORGANIC COLLOIDS AND NATURAL WATERS,
Geological Survey, Washington, D.C.
Irving A. Breger.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 563-574, June 1970. 12 p, 15 ref.

Descriptors: *Organic matter, *Surface waters, *Sea water, *Colloids, Chromatography, Analytical techniques, Spectroscopy, Organic compounds, Lipids, Humic acids, Oily water, Chemical reactions, Chemical analysis, Water pollution sources, Pollutant identification.
Identifiers: *Organic colloids.

Most studies of organic substances in natural waters and associated sediments are concerned with the isolation and identification of relatively simple compounds. Complex compounds of high molecular weight, which may account for as much as 90% of the total organic matter, are being neglected because they are so difficult to characterize. The complex material consists of high polymers which must have colloidal properties. Interactions among these substances may lead to phenomena such as syneresis, coprecipitation, adsorption, flocculation or protection, and may result in unusual associations of compounds. As a result, the simple compounds found in natural waters may, to an appreciable extent, represent merely the residua from such colloidal interactions. Without some knowledge and consideration of the colloidal phenomena that may take place, therefore, explanations for the occurrences of dissolved compounds should be viewed with skepticism. (See also W71-11226) (Knapp-USGS)
W71-11249

BIBLIOGRAPHY OF TRITIUM STUDIES RELATED TO HYDROLOGY THROUGH 1966,
Geological Survey, Albany, N.Y.; and Geological Survey, Washington, D.C.
Edward C. Rhodehamel, Veronica B. Kron, and Verda M. Dougherty.
For sale by Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402--Price 75 cents. Geological Survey Water-Supply Paper 1900, 1971. 174 p.

Descriptors: *Bibliographies, *Tritium, *Hydrogeology, *Tracers, *Path of pollutants, Radioisotopes, Fallout, Tracking techniques, Hydrology, Surface waters, Groundwater.
Identifiers: *Tritium bibliography.

This bibliography is a compilation of publications that are related to the use and application of tritium in hydrology during the 25 years 1942 through 1966. The main list of references is classified as to the principal subject matter of each item, and an auxilliary bibliography contains background knowledge about radioactivity, analytical techniques, and the various environments in which tritium exists. The introduction provides a brief discussion of the nature, sources, abundance, and uses of tritium that are applicable to hydrology. The classification index consists of two parts: (1) a principal topics and subject code conveniently placed before the main bibliography, and (2) an alphabetically listed principal-subject index following the main bibliography. An auxiliary reference list is divided into broad fields of knowledge, such as pedology, atmosphere, analytical methods, and groundwater. This part is alphabetically arranged by authors within these categories. These references do not refer to tritium studies as such, but are those closely related by the nature of the investigation or by the subject investigated. (Knapp-USGS)
W71-11254

TRITIATED WATER AS A TRACER IN THE DUMP LEACHING OF COPPER,
Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center., and Institute of Mining and Technology, Socorro, N. Mex. Dept. of Ground-water Hydrology.
F. E. Armstrong, G. C. Evans, and G. E. Fletcher.
Bureau of Mines Report of Investigations RI 7510, May 1971. 39 p, 12 fig, 5 tab, 10 ref, 5 append.

Descriptors: *Tritium, *Tracers, *Leaching, *Copper, *Waste dumps, Mine wastes, Mining, Groundwater movement, Flow profiles, Sampling, Data collection, Wells, Methodology, Chemical analysis.
Identifiers: Tritiated water (Tracer), Mine dump leaching.

Tritiated water was used as a tracer to follow the path of leach liquids as they flow through a coppermine dump. Semipermeable layers, produced within the dump by compaction and 'stratification' of deposited dump material, restrict the vertical movement of water. Knowledge of this restriction aids in the optimization of the leaching process. The portion of the dump studied was approximately 2,000 feet long, 800 feet wide, and 200 feet high. A total of 94 curies of tritiated water was injected into the dump at the rate of 650 gpm over a period of 39 hours. The leach liquid was sampled at natural surface outflows and through a series of wells, some drilled to the bottom of the dump and others to intermediate levels. More than 3,300 samples were analyzed either by liquid scintillation counting or by gas counting. Data obtained permitted calculation of flow paths, recycle times, total fluid volume, and estimates of retention times in various portions of the dump. Leaching with subsequent recovery from the pregnant leach liquid is an important source of copper. (Woodard-USGS)
W71-11255

WATER AND OREGON'S ECOLOGY.
Oregon State Univ, Corvallis.

Oregon Water Resources Research Institute, Fall Quarter 1970 Seminar Report WR 013.70, January 1971. 164 p.

Descriptors: *Hydrology, *Estuarine environment, *Fisheries, *Grasslands, *Lakes, Water demand, Water supply, Water utilization, Domestic water, Eutrophication, Recreation, Hydrologic cycle, Water management (Applied), Agricultural watersheds, Land management, Pesticide residues, Reservoirs, Land development, Land management, Natural resources.
Identifiers: *Oregon, *Pacific coast, *Estuary protection, Tidal flats.

This report consists of 28 papers relating to hydrology and ecology that were read at a faculty-student seminar held at Oregon State University in the fall of 1970. The purpose of this seminar was to present a group of papers prepared by some selected faculty members and graduate students dealing with Oregon's current water resources and ecological needs and to invite open discussions on these papers. Among those present taking part in the discussions were faculty members, leaders of local conservation groups, and representatives of various federal and state agencies. The meetings were open to the general public. (See also W71-11261 and W71-11262) (Glasby-USGS)
W71-11260

PESTICIDES AND GROUND WATER,
Oregon State Univ., Corvallis, Dept. of Civil Engineering.
Ralph C. Olsen.
In: Water and Oregon's Ecology, Oregon Water Resources Research Institute, Fall Quarter 1970 Seminar Report WR 013.70, p 79-81, January 1971. 3 p, 4 ref.

Descriptors: *Aquifers, *Groundwater recharge, *Artificial recharge, *Pollutants, *Pesticides, Artesian wells, Confined water, Geohydrologic units,

Groundwater, Hydrogeology, Fungicides, Herbicides, Impaired water quality, Public health, Soil contamination effects, Water pollution effects, Water quality control, Chemcontrol.

Problems are discussed in both natural and artificial groundwater recharge employing surface water that has been subjected to mild pesticide contamination. Two specific cases in the United States are mentioned and discussed, one in Colorado, and one in Texas. Depending on aquifer conditions, groundwater moves at rates ranging from about 5 ft per day to 50 ft per year. Therefore, pollution may not show up until long after the source has ceased polluting. A recharge experiment on the Ogallala Aquifer involved addition of DDT, nitrate and a tracer with the recharge water for 10 days of injection. The well was then pumped for 12 days. Of the 3.11 lb of DDT used in recharging only 0.142 lb was received by the pumping, and this recovery was from adsorbtion on the sand particles. Standards are especially needed for persistent complex organic pesticides. (See also W71-11260) (Glasby-USGS)
W71-11261

WATER QUALITY IN THE LOWER WILLAMETTE,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
Gary R. Polvi.
In: Water and Oregon's Ecology, Oregon State University Water Resources Research Institute Fall Quarter 1970 Seminar 013.70, p 125-128, January 1971. 4 p, 5 ref.

Descriptors: *Oregon, *Columbia River basin, *Water pollution sources, *Water pollution control, *Water quality, Thermal pollution, Acid streams, Aquatic microbiology, Environmental engineering, Multiple-purpose projects, Pollution abatement, Public health, Farm wastes, Industrial wastes, Pulp wastes, Sulfide liquors, Wood wastes, Organic wastes, Sewage bacteria, Sewage treatment, Waste treatment.
Identifiers: *Willamette River (Oreg), Oregon City (Oreg), Portland (Oreg).

Pollution problems of the lower Willamette River in northwestern Oregon between Oregon City and Portland are discussed, and measure are suggested to upgrade the overall water quality of that part of the river. As much as 90% of this pollution is industrial, derived mainly from pulp and paper mills along the Willamette, while the remainder is principally of domestic origin. Due to its rather deep channel and slow moving current, especially during the summer months, very little mixing action occurs to aid in aeration. During this period both bacterial and algal growth is high resulting from increased water temperatures (68C-71C) along with the presence of moderate to heavy concentrations of fertilizer residues. New treatment measures are now under consideration. This river pollution problem can be approached and handled through such ways as recycling and reuse of industrial waste waters and the modification of industrial waste products. (See also W71-11260) (Glasby-USGS)
W71-11262

SOURCES OF PHOSPHATE, AMMONIUM AND NITRATE CONTAMINATION IN SOME CENTRAL NEW JERSEY STREAMS,
Rutgers-The-State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
Aytekin Bilgin.
M Sc Thesis, Rutgers University Graduate School, March 1971. 113 p, 29 fig, 7 map, 1 tab, 60 ref. OWRR Project A-027-NJ (1).

Descriptors: *New Jersey, *Water pollution sources, *Pollutants, *Phosphates, *Nitrates, Surface runoff, Leaching, Sewage disposal, Chemical wastes, Domestic wastes, Farm wastes, Industrial wastes, Fertilizers, Ammonia, Nitrogen cycle, Nutrients, Nitrification, Decomposing organic matter, Eutrophication, Balance of nature, Biochemical oxygen demand, Aquatic productivity.
Identifiers: *Middlesex County (N J), *Somerset County (N J), *Mercer County (N J), New Brunswick (N J), Princeton (N J).

A study was made from April to October 1970 of pollution in seven streams located in Middlesex, Somerset, and Mercer Counties, New Jersey. The objective of this investigation was to determine the origin, source, and concentrations of phosphate, ammonium, and nitrate polluting the streams. The following were the areas studied: Beaverdam Brook (E. Brunswick), Mile Run (New Brunswick), Six Mile Run (New Brunswick), Millstone River (Princeton), Rock Brook (Zion), Duck Pond Run (Princeton), and Big Bear Brook (Hightstown). Of these, Millstone River, located near a sewage disposal plant, and Mile Run, near a chemical plant, produced the highest phosphate and ammonia levels. Mile Run had the greatest BOD because of the heat and wastes polluting it. Nitrate contamination developed principally in areas where eutrophic conditions existed for some years, and where surface runoff leached out fertilizer residues from suburban lawns and cultivated agricultural soils. Moderate nitrate contamination was seen in Six Mile Run, Big Bear Brook, and Duck Pond Run. The highest nitrate level occurred in Beaverdam Brook where the adjacent watershed had been completely altered some 5 years earlier by bulldozing and grading operations. This activity completely destroyed the original soil profile and broke up and buried the former organic layer so that mineralization and nitrification was rapidly increased. (Glasby-USGS)
W71-11267

EVALUATION OF THE RISKS RELATED TO THE DISCHARGE OF RADIOACTIVE ISOTOPES IN A MARINE ECOSYSTEM,
Comitato Nazionale per l'Energie Nucleare, La Spezia (Italy). Laboratorio per lo Studion della Contaminazione Radioattive del Mare.
M. Bernhard.
Revue Internationaled' Oceanographie Medicale, Vol 20, 1970, p. 125-131. 3 tab, 10 ref.

Descriptors: *Sea water, *Radioisotopes, Marine microorganisms, Measurement, Ecosystems, Shores, Physicochemical properties.

The concentration factor approach and the specific activity approach have been used to determine the maximal permissible concentration of radionuclides in sea water after physical dilution, and these two methods are compared. The first is more useful when applied to elements which are not regulated by the organisms, while the second is more easily applied to regulated elements. Concentrations of various stable elements in a typical Mediterranean ecosystem are tabulated. Since it is known that for certain elements geochemical equilibriums are reached very slowly and that certain physicochemical forms of an element are more readily available to marine organisms, knowledge of the kinetics of the different possible physicochemical states is necessary to make a valid prediction with both approaches. Given sufficient good data, both approaches should give the same values. (Smith-PAI)
W71-11268

THE ROLE OF VERTEBRATES IN THE UPTAKE AND LOSS OF RADIOISOTOPES,
Comitato Nazionale per l'Energia Nucleare, La Spezia (Italy). Laboratorio per lo Studio della Contaminazione Radioattiva del Mare.
M. Bernhard.
Revue Internationale d' Oceanographie Medicale, Vol. 20, 1970, p 101-123, 10 fig, 3 tab, 20 ref.

Descriptors: *Marine fish, *Radioisotopes, *Food chains, Marine microorganisms, Fish food organisms, Measurement, Radioactivity, Model studies, Absorption.

It is reasonable to assume that in the future the amount of fish in human diet will decrease, since even countries with a high fish consumption give preference to meat. Two models have been proposed to predict the degree of radiocontamination in marine organisms. The concentration factor model implies that the activity of a given radioisotope in the organisms, its organs and tissues, is always proportional to the activity of this radioisotope in the environment of the organisms. The specific activity model is more useful for regulated elements, as the degree of contamination can be estimated from the specific activity in the environment and the chemical concentration of the element in the organism. It is evident that in the investigations on the uptake of radioisotopes and their stable isotopes it is very useful to determine whether an element is regulated or not. Only a little data is available on the uptake and loss of marine vertebrates in which also the role of the stable element has been considered. More data is needed on the biological half-life and on transport through the food chain. (Smith-PAI)
W71-11270

INPUT OF POLYCHLORINATED BIPHENYLS INTO CALIFORNIA COASTAL WATERS FROM URBAN SEWAGE OUTFALLS,
California Univ., Berkeley. Marine Resources Inst.
Timothy T. Schmidt, Robert W. Risebrough, and Franklin Gress.
Bulletin of Environmental Contamination and Toxicology, Vol 6, No 3, May-June, 1971. p 235-243, 2 fig, 1 tab, 17 ref.

Descriptors: *Water pollution sources, *Pollutant identification, *Sea water, Coasts, *Industrial wastes, *Sewage effluents, Sampling, Marine fish, Birds, Food chains, California.
Identifiers: *Polychlorinated biphenyls, Los Angeles, San Francisco, San Diego.

The quantities of polychlorinated biphenyls occurring in marine fish and birds in California coastal waters are found to be second only to DDT as pollutants of the marine food chain, therefore it is important to discover and monitor the sources of PCB. Studies in Europe and Florida have traced PCB contamination to sewage waste discharged into the sea. In California nine sewage treatment plants which discharge sewage to the sea in the San Francisco, Los Angeles and San Diego areas were tested for PCB concentrations in December, 1970. All samples were taken from sewage outfalls at sites closest to points of entry into the sea. Care was taken that the sample bottles were uncontaminated, and degradation of the samples through microbial action was prevented. In the laboratory an extraction and cleaning process was followed and PCB was identified by the presence of profiles on chromatograms. The results are tabulated, and the highest output was recorded from Los Angeles County, one of the most industrialized areas of the state, indicating that urban sewage effluent is a significant source of the PCB in coastal waters and should be periodically monitored. (Smith-PAI)
W71-11290

TRITIUM IN HYDROLOGY,
University of the Witwatersrand, Johannesburg (South Africa). Nuclear Physics Research Unit.
B. Th. Verhagen.
South African Journal of Science, Vol 67, No 4, April 1971. p 289-295, 4 fig, 1 tab, 17 ref.

Descriptors: *Hydrologic cycle, *Tritium, Water pollution, Rainfall, Fallout, Measurement, Nuclear explosions, Groundwater, Seasonal, Radioisotopes.
Identifiers: South Africa.

Tritium is a useful, but hard to detect, natural tracer in the hydrological cycle. Increased concentrations of tritium in the stratosphere have occurred in the last 20 years because of the explosion of thermonuclear devices, mainly in the Northern Hemisphere, thus disturbing the quasi steady-state in natural tritium levels. Large pulses of artificial

tritium have been added to the hydrological cycle, and in the Northern Hemisphere these perturbations are used in simple tracing experiments. In expectation of a French test explosion series in the Southern Pacific, air moisture samples will be collected from a number of sites in South Africa and analyzed for tritium, thus providing immediate information on the arrival of any bomb tritium, even in the absence of precipitation. Gas proportional counting of the samples to be analyzed is employed and the method is described. Measurements of tritium concentrations in South African rains since 1964 show variations due to climatic, seasonal and rainfall effects. The greater bulk of tritium finding its way into the hydrological cycle is injected during the spring leak. Groundwater research with tritium in the semi-arid country of Botswana by borehole sampling is also discussed. (Smith-PAI)
W71-11293

SIMULATION OF STREAM PROCESSES IN A MODEL RIVER,
Texas Univ., Austin. Center for Research in Water Resources.
Thomas J. Padden, and E. F. Floyna.
Available from the National Technical Information Service as PB-202 159, $3.00 in paper copy, $0.95 in microfiche. Texas University Center for Research in Water Resources Technical Report No 2 (EHE-70-23, CRWR-72), May 1971. 130 p, 32 fig, 24 tab, 27 ref. OWRR Project B-044-TEX (2).

Descriptors: *Model studies, *Water pollution sources, *Oxygen sag, *Oxygenation, Reaeration, Hydraulic models, Turbulent flow, Self-purification, Path of pollutants, Waste assimilative capacity.

Various stream processes which contribute to reoxygenation or deoxygenation were studied separately under controlled conditions in aquaria and in a research flume. Stream processes were simulated as a model river consisting of benthos and photosynthetic organisms. In another channel an identical ecosystem was established and stressed with an organic pollutant. The conditions established in these model rivers were those assumed in the development of various sag equations. The stressed ecosystem behaved in accordance with sag equations proving the validity of the classical predictive formulas and validity of simulation of stream processes in the model river. A formulation for atmospheric reaeration constants for flowing systems as a function of velocity and depth was developed from data obtained in the model river. (Knapp-USGS)
W71-11297

BUOYANT SLOT JETS INTO STAGNANT OR FLOWING ENVIRONMENTS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
Klas Cederwall.
California Institute of Technology, W. M. Keck Laboratory of Hydraulics and Water Resources Report No KH-R-25, April 1971. 86 p, 29 fig, 5 tab, 28 ref. EPA Research Grant No 16070 DGY.

Descriptors: *Mixing, *Jets, *Stagnant water, *Running waters, Model studies, Pumping, Tracers, Thermodynamic behavior, Diffusion, Flow characteristics, Mathematical studies, Equations, Laboratory tests, Analytical techniques, Flow profiles, Forecasting, Water pollution sources.
Identifiers: *Buoyant jets, Plume patterns, Mixing forecasting.

The diffusion following the release of a buoyant slot jet into a confined, uniformly flowing environment was studied. Experiments were conducted first with a horizontal buoyant slot jet into stagnant, ambient fluid. In addition, two sets of experiments were performed with a vertical and a horizontal buoyant slot jet issuing into a uniformly flowing stream. A two-layer flow analysis provided the rationale for a classification of flow regimes. The mechanism of upstream intrusion of jet effluent is characterized primarily by a gross densimetric Foude number based on the ambient flow velocity and the buoyancy flux from the source. However, the formation of an upstream wedge may be hampered due to the effect of initial flux of momentum in the downstream direction. When the buoyant slot jet cannot entrain all the oncoming flow, while maintaining the typical jet or plume behavior, then the jet flow pattern breaks up and there is efficient mixing close to the source. (Woodard-USGS)
W71-11340

IMPLICATIONS OF POLLUTION TO THE McMURDO SOUND BENTHOS,
Scripps Institution of Oceanography, La Jolla, Calif.; and Washington Univ., Seattle. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W71-11341

SIMULATION OF WATER QUALITY IN STREAMS AND CANALS,
Masch (Fred D.) and Associates, Austin, Tex; and Texas Water Development Board, Austin.

Texas Water Development Board Report 128, Austin, May 1971. 64 p, 13 fig, 6 tab, 25 ref.

Descriptors: *Water quality, *Simulation analysis, *Streams, *Mathematical models, *Texas, Canals, Chemical analysis, Water temperature, Dissolved oxygen, Biochemical oxygen demand, Dissolved solids, Chlorides, Sulfates, Forecasting, Wastes, Water pollution.

The QUAL-I mathematical modeling system presented is designed to simulate water-quality parameters, and is one of several simulation systems being developed by the Texas Water Development Board to assist in more refined water planning and management. The set of interrelated quality routing models (QUAL-I) is useful for the prediction of the temporal and spatial distribution of temperature, biochemical oxygen demand and dissolved oxygen, and conservative minerals within a segment of a river basin. The governing differential equation is solved by an implicit-finite-difference technique under the assumption that advection along the primary axis of flow (longitudinal axis of the stream channel) is the primary mode of transport. Comparison of the predictions of this modeling system and field data from a segment of a river basin containing multiple headwater sources, waste loadings, and branching streams produced good agreement between predicted and observed quality profiles. (Woodard-USGS)
W71-11352

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE RED RIVER BASIN, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W71-11353

A METHOD TO DESCRIBE THE FLOW OF RADIOACTIVE IONS IN GROUND WATER,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07B.
W71-11356

RELEASE OF METHYL MERCURY FROM SEDIMENTS WITH LAYERS CONTAINING INORGANIC MERCURY AT DIFFERENT DEPTHS,
Swedish Water and Air Pollution Research Lab., Stockholm.
Arne Jernelov.
Limnology and Oceanography, Vol 15, No 6, p 958-960, November 1970. 3 p, 1 fig, 6 ref.

Descriptors: *Water pollution sources, *Sedimentation, *Heavy metals, *Path of pollutants, *Ecology, Aquatic habitats, Sediment distributions, Surface waters, Water pollution, Water pollution effects, Fish.
Identifiers: *Mercury, *Water pollution (Mercury).

Laboratory experiments show that in a system without macroorganisms, formation and release of methyl mercury occurs almost entirely in the upper centimeter of the sediment and in such a situation natural sedimentation must be important to the turnover of mercury deposits in the sediment. High concentrations of Tubificidae change the situation somewhat, but Anadonta at a high population density changes it considerably. It would thus seem possible to 'lock in' the mercury in the sediment by covering layer of 3 cm if there were no macroorganisms, or only Tubificidae, present. But if Anodonta is present a covering layer of 10 cm would be required. In the absence of Anodonta natural or artificial sedimentation could contribute to purification of a mercury-contaminated aquatic ecosystem. In its presence, such sedimentation would be relatively ineffective. (Woodard-USGS)
W71-11358

DETERMINATION OF POLLUTIONAL POTENTIAL OF THE OGALLALA AQUIFER BY SALT WATER INJECTION,
Robert S. Kerr Water Research Center, Ada, Okla.
For primary bibliographic entry see Field 05G.
W71-11361

REGULATIONS PERTAINING TO WASTE DISCHARGE PERMITS.
Oregon Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 06E.
W71-11367

RADIOACTIVITY TRANSPORT IN WATER--EFFECTS OF ORGANIC POLLUTION ON RADIONUCLIDE TRANSPORT,
Texas Univ., Austin. Center for Research in Water Resources.
Kazuhiro Futagawa, and Ernest F. Gloyna.
Technical Report No. 16, EHE-04-6803, CRWR-27, ORO-16, May 1968, 61 p, 14 fig, 4 tab, 31 ref. U.S. Atomic Energy Commission Contract AT-(11-1)-490.

Descriptors: *Radionuclide, *Dissolved oxygen, *Rivers, Oxidation, Photosynthesis, Respiration, Scour, Saturation, Mixing, Diffusion, Sedimentation, Absorption, Biochemical oxygen demand, Aeration, Temperature, Flow, Algae, Benthos, Aerobic conditions, Anaerobic conditions, Water pollution sources, Path of pollutant.

Radionuclide transport in water can be affected by the presence of organic pollution in two ways. One of these ways is related to the lack of dissolved oxygen caused by biological decomposition of organic pollutants. The other mechanism is determined by the effects of the interactions of the radionuclides with the organic material itself. As a preliminary step towards a more complete explanation of the dissolved oxygen deficit effect, the ecological environment of a river system was simulated in a specially adapted research flume. Distribution of dissolved oxygen and re-aeration rates were then mathematically modeled using data taken from the model river. Using a water depth of 1.0 ft, reaeration rate constants were determined at a flow of 1.7 in/min and 28C. The values for the reaeration rate constants were 0.18 and 0.23 respectively. With a 200 mg/l concentration of dextrine in the influent, the biological oxidation rate constant in the model river was determined to be 0.006, which was quite low in comparison with values determined on full scale rivers. It was also determined the variability of the environmental factors which determine photosynthetic oxygen production precluded the use of algal produced oxygen as a reliable oxygen source. However, since the various photosynthetic-respirationships can be measured in a model with suitable accuracy, the future,

more intensive, radionuclide transport studies can proceed. (Lowry,Texas)
W71-11381

DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWATER FLOW IN OVERFERTILIZATION OF SURFACE WATERS,
Minnesota Univ., Minneapolis. Water Resources Research Center.
Jack D. Johnson, and C. P. Straub.
Available from the National Technical Information Service as PB-202 212, $3.00 in paper copy, $0.95 in microfiche. Minnesota Water Resources Research Center, Minneapolis, WRRC Bulletin 35, June, 1971, 176 p, 58 fig, 65 tab, 78 ref, 4 append. OWRR Project B-012-MINN (1).

Descriptors: *Mathematical models, *Watersheds (Basins), *Nutrients, Nitrogen, Phosphorus, Streamflow, Sewage treatment, Effluents, Annual wastes, Fertilizers, Precipitation (Atmospheric), Soils, Water pollution sources, Model studies, Minnesota, Snowmelt, Treatment facilities, Nitrogen fixation, Denitrification.
Identifiers: *Manure spreading, *Spring runoff, Depletion processes, Nitrogen transformation, Agricultural practices, Feedlot drainage, New Prague (Minn).

A nutrient enrichment accounting mathematical model was devised for the New Prague watershed in Minnesota. The New Prague watershed is 23.3 square miles in area and is predominately a rural watershed. Model input data was collected over a 2 1/2-year period from a stream gaging station and two automatic sampling stations. Over 800 water samples were analyzed. Extensive effort was placed on better understanding the nitrogen and phosphorus cycles. It is evident that the spring runoff process and accumulative winter fertilizer applications constitute the major portion of diffuse sources of nutrients in the watershed. Point sources from feedlots and municipal and industrial effluents contribute only 11 percent of the sigma N (total nitrogen, four components) and 7 percent TP (total phosphorus). Disperse sources accounted for 89 percent of sigma N and 93 percent of TP, with spring runoff in the two months of March and April accounting for 79 percent of the annual sigma N and 64 percent of the TP. The nutrient output from the watershed could be decreased by increasing penetration of the large amounts of sigma N and TP in snowpacks into the soil through land terracing to retart rapid spring runoffs and sub-surface drains to allow rapid drainage during the crop season.
W71-11400

NITRIFICATION IN SURFACE WATERS TRIBUTARY TO LAKE SUPERIOR,
Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
Robert C. Baillod, and John B. Sebba.
Available from the National Technical Information Service as PB-202 222, $3.00 in paper copy, $0.95 in microfiche. Completion Report, June, 1971, 190 p, 13 fig, 20 tab, 2 maps, 78 ref, 8 append. OWRR Project No. A-037 MICH (1).

Descriptors: *Nitrification, *Nitrates, *Nitrogen compounds, Streams, Michigan, *Municipal wastes, Water pollution sources, Ammonia compounds, Water temperature, Biochemical oxygen demand.
Identifiers: Nitrate nitrogen, Ammonia nitrogen, Oxygen uptake.

Nitrification in streams of the western Upper Peninsula of Michigan was studied. The maximum nitrate content observed was 3.7 mg/l-N which occurred during the summer. About 92 percent of the streams contained less than 1.0 mg/l nitrate nitrogen, and 40 percent showed no detectable nitrate concentration at all. The basins of streams with greater than 1.0 mg/l-N nitrate content were seen to include villages or rural communities. Samples of a stream known to receive municipal wastes were incubated under controlled temperature conditions and oxygen uptake was monitored. Addition of 2 mg/l ammonia nitrogen increased the first order BOD rate constant, ultimate nitrate concentration and the percent BOD attributable to nitrification. The first order BOD rate constant increased for a temperature rise from 20 to 25C but decreased when the temperature increased further to 30C. The data gathered indicate that other factors not studied here, influence nitrification in natural waters. Among these might be mixing conditions and occurrence of dentrification.
W71-11401

ANIMAL WASTE UTILIZATION FOR POLLUTION ABATEMENT - TECHNOLOGY AND ECONOMICS, PHASE I,
Nebraska Univ., Lincoln. Water Resources Research Inst.
O. E. Cross.
Available from the National Technical Information Service as PB-202 214, $3.00 in paper copy, $0.95 in microfiche. Project Completion Report, Nebraska Water Resources Research Institute, Lincoln, June, 1971, 34 p, 7 fig, 13 tab, 2 ref. OWRR Project B-003-NEB (1).

Descriptors: *Water pollution, Sources, *Farm wastes, Water utilization, *Pollution abatement, Crop response, Soils, *Irrigation water, Waste disposal, Sodium, Potassium, Electrical conductance.
Identifiers: *Manure disposal, *Animal waste utilization, Nitrate nitrogen.

The pollutional potential of the surface runoff water was based upon the following factors: nitrate nitrogen, sodium, potassium, and electrical conductance. Based upon these four factors, this study indicates that high manure applications to cultivate soils will cause pollution of surface runoff water only during the first fifteen minutes of the first runoff event. Although 'polluted', the concentration of pollutants in this runoff water is below the limits set for irrigation water. Hence, all runoff should be re-cycled for irrigation uses only. After one year of heavy manure application, the underground water (STATIC LEVEL AT $ FEET BELOW GRADE) retains potable quality. Indications are that repeated annual application of heavy rates of manure on land will lead to deterioration of the physical properties of soil, owing to the large amounts of sodium and potassium in manure. Also, feeding large quantities of sodium and potassium beyond the minimum requirement for the animals should be avoided. Irrigation techniques indicate: (1) the initial intake of water into the soil increases as higher manure loadings are applied, (2) the basic intake rate is higher on areas plowed 8 inches deep, and (3) the basic intake rate on any specific manure loaded area increases with time elapsed from date of manure application.
W71-11405

ENVIRONMENTAL ASPECTS OF MERCURY USAGE.
Dow Chemical Corp., Midland, Mich.
For primary bibliographic entry see Field 05C.
W71-11417

SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION,
Oregon State Univ., Corvallis. Air Resources Center.
For primary bibliographic entry see Field 06E.
W71-11432

LOUISIANA FISHERIES RESOURCES POLLUTION PROBLEMS AND RECOMMENDED SOLUTIONS,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 05G.
W71-11453

POLONIUM-210 IN THE MARINE ENVIRONMENT,
Cape Town Univ. (South Africa).
L. V. Shannon, R. D. Cherry, and M. J. Orren.
Geochimica et Cosmochimica Acta, Vol 34, p 701-711, 1970, Pergamon Press. 1 fig, 2 tab, 30 ref.

Descriptors: *Sea water, *Water pollution sources, *Radioactivity, Lead radioisotopes, Plankton, Phytoplankton, Solvent extractions, Radioisotopes, Geochemistry, Sampling, Pollutant identification.
Identifiers: *Polonium-210, *Lead-210, South Africa.

Increasing radioactivity in the natural environment from lead-210 and polonium-210 has led to the development of a method for determining these nuclides in sea water and plankton by solvent extraction, followed by electrodeposition and alpha counting. Twenty-nine sea water samples were collected off the Cape of Good Hope during March 1969, and the polonium was extracted and plated out. By allowing any lead supported polonium-210 to build up, the lead content was estimated. The mean activities of lead-210 and polonium-210 in these samples were 38x10 minus 15 c/l and 20x10 minus 15 c/l respectively. Real variations in the concentrations of these nuclides were found to exist, and these could in part be ascribed to different water masses and current systems. The lead-210 and polonium-210 contents of eleven zooplankton and three phytoplankton samples collected during the same period were also determined. Mean values for lead-210 and polonium-210 in zooplankton were 33 pc/kg wet weight and 399 pc/kg wet weight respectively. A correlation between these nuclides in zooplankton was found to exist, the lead-210 activity being on the average one-twelfth of the polonium-210 activity. This data, combined with certain stated assumptions, is the basis for an evaluation of the biogeochemical balance of lead-210 and polonium-210 in the marine environment. The removal times of these nuclides from the upper mixed layer have been calculated and found to be about 5 yrs for lead-210 and 0.6 yrs for polonium-210. (Smith-PAI)
W71-11469

MERCURY IN A COASTAL MARINE ENVIRONMENT,
Southampton Univ. (England). Dept. of Oceanography.
J. D. Burton, and T. M. Leatherland.
Nature, Vol 231, no 5303, June 1971, p 440-441. 1 tab, 6 ref.

Descriptors: *Water pollution sources, *Sea water, *Food chains, *Heavy metals, Estuaries, Spectrophotometry, Neutron activation analysis, Aquatic life, Mollusks, Pollutant identification.
Identifiers: *Mercury, Great Britain.

The occurrence of mercury in the oceans is a result of human activities and continental weathering, and it is important to learn more about the distribution and behavior of the element in low or negligible pollution environments. Mercury in natural waters was determined spectrophotometrically with dithizone, after preliminary concentration and separation. Mercury in organisms and sediments was determined by neutron activation analysis of freeze-dried material. The concentrations found in the samples are tabulated. The values for seawater outside Southampton Water vary between 0.014 and 0.021 g of Hg/l. Comparison with other data is complicated by regional and analytical variations. The concentration in river water was found to be less than in the estuary and open seawater. Concentrations were found to be higher in mollusks than in whole organisms without shells. The role of sediments in the transport of mercury in food chains is significant, particularly for bottom living, suspension feeding animals, and may be important in estuaries where considerable resuspension of sediment can occur. Further knowledge is needed of natural background concentrations and their relation to permissible limits for sea foods. (Smith-PAI)
W71-11470

CHLORINATED HYDROCARBONS IN THE MARINE ENVIRONMENT.
National Academy of Sciences-National Research Council, Washington, D.C. Committee on Oceanography.

National Academy of Sciences, Washington, D.C., 1971. 42 p.

Descriptors: *DDT, *Pesticide residues, *Persistence, *Degradation (Decomposition), *Aquatic environment, Balance of nature, Pollutant identification, Sampling, Water pollution sources.
Identifiers: Persistent chlorinated hydrocarbons, Marine environment, Half-life.

The oceans are the ultimate accumulation site for the persistent chlorinated hydrocarbons. As much as 25 percent of the DDT compounds produced to date may have been transferred to the sea. The amount of DDT compounds in the marine biota is estimated to be less than 0.1 percent of total production, yet this amount has produced a noticeable impact upon the marine environment. The rate at which such substances degrade to harmless products in the marine system is unknown; the half-lives of some of the more persistent materials are of the order of years, and perhaps even decades and centuries. If most of the remaining 75 percent of the persistent chlorinated hyrocarbons is in reservoirs that will in time transfer their contents to the sea, we may expect an increased level of these substances in marine organisms. It is recommended that: (1) A massive effort should be made immediately to check the escape of persistent toxicants into the environment, (2) rates of entry of each pollutant into the marine environment be determined and (3) the laws relating to the registration of chemical substances and the release of production figures by the government be examined. (Ensign-PAI)
W71-11472

MERCURY IN THE NATURAL ENVIRONMENT: A REVIEW OF RECENT WORK,
Geological Survey of Canada, Ottawa (Ontario).
For primary bibliographic entry see Field 05A.
W71-11494

AIRBORNE AMMONIA EUTROPHIES LAKES.

Agricultural Research (USDA), Vol. 19, No. 2, p 8-9, August 1970.

Descriptors: *Ammonia, *Eutrophication, *Nitrogen, Algae, Water pollution sources, Colorado, Cattle, Urine, Path of pollutants, Farm wastes.
Identifiers: Feedlots.

Ammonia traps and rain gages were installed at five sites and in two control areas in Colorado to determine the rate at which ammonia is adsorbed directly from the air by water surfaces under different conditions of temperature and climate at various distances and directions from cattle feedlots. In one northeast Colorado lake a little over a mile from a large feedlot, the surface adsorbed about 30 pounds of nitrogen as ammonia per acre per year. This amount is sufficient to eutrophy a lake averaging 20 feet in depth to two or three times the concentration needed for algal blooms. Indications are that even small feedlots may release enough ammonia to have an effect on nearby water surface and that airborne ammonia from feedlots may contribute more nitrogen than runoff and deep percolation from the same sources. (Mortland-Battelle)
W71-11496

PESTICIDES IN WATER: COPPER SULFATE IN FLOODED CRANBERRY BOGS,
Massachusetts Univ., East Wareham. Cranberry Experiment Station.
For primary bibliographic entry see Field 05A.
W71-11498

RIPARIAN RIGHTS AND THE 'NECESSARY INDUSTRY DOCTRINE,' STREAM POLLUTION--INJUNCTION AGAINST--DAMAGES FOR,
For primary bibliographic entry see Field 06E.
W71-11501

SIGNIFICANCE OF THE FOOD CHAIN IN DDT ACCUMULATION BY FISH,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
Kenneth J. Macek, and Sidney Korn.
Journal of the Fisheries Research Board of Canada, Vol 27, No 8, p 1496-1498, August 1970. 1 fig, 3 ref.

Descriptors: *DDT, *Brook trout, *Food chain, Bioassays, Animal pathology, Pesticide residues, Water pollution effects, Lake Michigan.
Identifiers: Biological magnification.

A laboratory study was conducted to evaluate the relative importance of food and water as sources of DDT for fish. Brook trout were used in the experiments and were placed in two groups. One group was exposed to an effective concentration of plus or minus 0.3 pptr DDT in water for 120 days. This is comparable to the residues in Lake Michigan. The second group was fed 3 plus or minus 0.15 ppm DDT incorporated into a dry pellet for 120 days. The mean total residue accumulated by the fish exposed to 3 ppm DDT in food was 1.92 ppm. For those exposed to 3 pptr DDT in water the mean total residue was 25.6 ppb. Thus, the fish exposed to DDT in water accumulated a mean of 3.55 percent of the total DDT available to them during exposure, while those exposed through their food accumulated 35.5 percent of the available DDT. Because there is generally a higher concentration of DDT in the food chain than in water, it was concluded that the food chain is the major source of DDT contamination in fish. (Mortland-Battelle)
W71-11508

YELLOW PHOSPHORUS POLLUTION: ITS TOXICITY TO SEAWATER-MAINTAINED BROOK TROUT (SALVELINUS FONTINALIS) AND SMELT (OSMERUS MORDAX),
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
For primary bibliographic entry see Field 05C.
W71-11509

NUTRIENT SUPPLY AND PRIMARY PRODUCTION IN CLEAR LAKE, EASTERN ONTARIO,
Trent Univ., Peterborough (Ontario).
For primary bibliographic entry see Field 05C.
W71-11512

ANALYSIS OF TRACE ELEMENTS IN SEAWEED,
Central Inst. for Industrial Research, Oslo (Norway).
For primary bibliographic entry see Field 05A.
W71-11515

BIOLOGICAL ASPECTS OF THERMAL POLLUTION. I: ENTRAINMENT AND DISCHARGE CANAL EFFECTS,
Oak Ridge National Lab., Tenn. Ecological Sciences Div.; and Minnesota Univ., Minneapolis. Dept. of Ecology and Behavioral Biology.
For primary bibliographic entry see Field 05C.
W71-11517

STREAM POLLUTION AND SPECIAL INTERESTS,
J. Mark Jacobson.
Wisconsin Law Review, Vol 8, p 99-133, 1933. 35 p, 68 ref.

Descriptors: *Judicial decisions, *Streams, *Waste disposal, *Water pollution control, Competing uses, Water pollution, Legal aspects, Reasonable use, Natural flow doctrine, Prior appropriation, Riparian rights, Cities, Sewage disposal, Remedies, Industrial plants, Industrial wastes, Mineral industry, Oil industry, Natural resources, Exploitation, Social aspects, Economic impact, Water pollution sources.

The law governing stream pollution is examined in this article and questions are raised concerning the accommodation of inherited pollution law to new situations and the pressure of special interests. In analyzing the law, the author discusses at length the: (1) common law natural flow doctrine, (2) reasonable use rule, (3) prior appropriation doctrine, (4) balance of convenience doctrine, and (5) available defenses. In evaluating the effect of special interests on stream pollution cases, the author raises the question of whether judges in interpreting the reasonable use rule have responded to special interest groups such as municipalities, factories, mines and the oil industry. To answer this question, attention is directed primarily to pollution cases growing out of municipal sewage disposal and the exploitation of natural resources. The author concludes that the record of court opinions indicates that judges permit their concepts of social and economic justice to influence their decisions. An authoritative solution to this problem must await detailed research into the records of trial courts, the background of judges, and the relative influence of various economic groups. (Gallagher-Florida)
W71-11520

INCIDENCE IN RIVER WATER OF ESCHERICHIA COLI CONTAINING R FACTORS,
Animal Health Trust, Stock (England).
For primary bibliographic entry see Field 05F.
W71-11540

SOURCE OF POLYCHLORINATED BIPHENYL CONTAMINATION IN THE MARINE ENVIRONMENT,
Freshwater Fisheries Lab., Pitlochry (Scotland).
A. V. Holden.
Nature, Vol. 228, No. 5277, p 1220-1221, December 19, 1970. 1 tab, 9 ref.

Descriptors: *Industrial wastes, *Sludge, Domestic wastes, Detergents, Chlorine, Gas chromatography, Dieldrin, Pesticide residues, Zooplankton, Herrings, Path of pollutants.
Identifiers: *Polychlorinated biphenyls (PCB), Gas-liquid chromatography, DDE, Organochlorine, Scotland.

High concentrations of polychlorinated biphenyls have been detected in the Firth of Clyde (Scotland). Samples of the water surface film and subsurface water were taken at various points in the estuary, and also at 2-mile intervals along the river to the centre of Glasgow, to detect any local discharges containing PCBs. No PCB residues could be found (limit of detection in water, 1 part in 10 to the 11th power) and samples of effluents discharged from trunk sewers into the estuary and in the Glasgow area also showed no significant concentrations of PCBs. Concentrations in zooplankton by comparison were less than 0.03 p.p.m. and in clupeoid fish up to 2.6 p.p.m. (both expressed on a wet weight basis). Samples of crude sewage sludge from such sewage plants in Glasgow and adjacent areas were analyzed for PCBs. It seems possible that the PCBs in the Clyde ecosystem result from routine dumping of crude sewage sludge from treatment works in Glasgow and adjacent areas. If there is an average of 2 p.p.m. dumped at a rate of 0.5 million tons of sludge per year, about 1 ton of PCB isomers per year would be discharged. (Mortland-Battelle)
W71-11541

SURVIVAL OF GREEN ALGAE IN RELATION TO CONDITIONS AND DURATION OF STORAGE,
Moscow State Univ. (USSR). Dept. of Microbiology.
For primary bibliographic entry see Field 05C.
W71-11556

PROLONGED STORAGE OF COLLECTION STRAINS OF SOME SPECIES OF ALGAE,
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
For primary bibliographic entry see Field 05C.
W71-11557

DISTRIBUTION OF HYDROCARBON-OXIDIZING MICROORGANISMS IN SOILS OF THE MAIN OIL DEPOSITS IN UZBEKISTAN,
Akademiya Nauk Ubzekskoi SSR, Tashkent. Microbiology Branch.
M. Ya. Andrusenko, B. I. Bil'mes, T. D. Dzhamalov, and V. I. Runov.
Microbiology (USSR), Vol 38, No 5, p 744-747, September-October 1969. 1 fig, 4 tab, 6 ref.

Descriptors: *Oil fields, *Soil bacteria, *Soil analysis, *Analytical techniques, Oil wastes, Pseudomonas, Mycobacterium, Seasonal, Temperature, Thermophilic bacteria, Isolation, Water pollution sources.
Identifiers: Soviet Union, Hydrocarbons, Mesophic bacteria, Pseudomonas fluorescens, Pseudobacterium marls, Proactinomyces ruber, Pseudomonas desmolyticum, Pseudobacterium rufus, Planococcus citreus, Chromobacterium rubidum, Planococcus casei, Bacterium aliphaticum, Mycobacterium lacticolumn, Proactinomyces paraffinae, Proactinomyces opacus, Chromobacterium naphtalani, Actinomyces, Micromonospora, Aspergillus, Penicillium, Sporotrichum, Alternaria, Stemphylium, Agars.

The content of hydrocarbon-oxidizing microorganisms in soils of oil deposits was determined in relation to temperature, place of isolation, medium of concentration, distance from the well and season. Quantitative calculations were made using serial dilutions on the mineral base of corresponding elective media, with the oil of the given deposit and individual hydrocarbons as sole carbon source. Leached agar was used in the preparation of the agar media. The hydrocarbons were added after sterilization. Growth was carried out at 28C on a shaker and at 45C with stationary conditions. The greatest number of hydrocarbon-oxidizing microorganisms was isolated from the Fergana oil deposit, the richest in n-alkanes, and the least from the Termez and Bukhara deposits. The most microorganisms were isolated at both of two temperatures on a medium with Ashby mineral base plus hydrocarbons. From oil-bearing soils at 28C representatives of the genera Pseudomonas, Mycobacterium, Bacterium, and Chromobacterium were isolated; and at 45C actinomycetes, proactinomycetes, and bacteria in smaller numbers. The activity and spectrum of hydrocarbon oxidation in the isolated cultures did not depend on the place of isolation and were established as peculiarities of the strain itself. (Mortland-Battelle)
W71-11560

THE ISOLATION OF VIRUSES FROM SEWAGE AND TREATED SEWAGE EFFLUENTS,
Council for Scientific and Industrial Research , Pretoria (South Africa). National Inst. for Water Research.
For primary bibliographic entry see Field 05A.
W71-11580

WATERS AND WATERCOURSES--PERCOLATING WATERS--POLLUTION.
For primary bibliographic entry see Field 06E.
W71-11594

MERCURY CONTROL ACT OF 1971 (A BILL TO PROVIDE FOR CONTROL OF THE USE OF THE ELEMENT MERCURY OR ITS COMPOUNDS, AND FOR OTHER PURPOSES).
For primary bibliographic entry see Field 06E.
W71-11629

5C. Effects of Pollution

DRAINAGE AND POLLUTION FROM BEEF CATTLE FEEDLOTS,
Cornell Univ., Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
For primary bibliographic entry see Field 05B.
W71-10994

DIFFERENCES IN BENTHOS UPSTREAM AND DOWNSTREAM OF AN IMPOUNDMENT,
Waterloo Univ. (Ontario). Faculty of Graduate Studies.
J. A. Spence, and H. B. Hynes.
Journal Fisheries Research Board of Canada, Vol 28, No 1, p 35-43, 1971. 6 fig, 5 tab, 25 ref.

Descriptors: *Benthos, *Downstream, *Upstream, *Dams, Impoundments, Aquatic life, Biological communities, Diatoms, Invertebrates, Diptera, Crustaceans, Mollusks, Amphipoda, Detritus.
Identifiers: *Shand Dam (Ontario), Belwood Lake (Ontario), Grand River (Ontario), Enteromorpha, Tricoptera, Ephemeroptera, Simuliida, Coleoptera, Hydropsychida.

Samples of water and macroinvertebrate riffle fauna were collected at one station above the Shand Dam on the Grand River, (Ontario) and at two stations below the dam. The downstream biocoenose was comparably to those formed under conditions of mild organic eutrophication. The accumulation of detritus and the lower temperatures in the downstream part eliminated Plecoptera sp and reduced some members of Stenonema, but augmented the populations of Ephemeroptera, Chironomidae, Simuliidae, Coleoptera, Hydropsychidae, and Amphipoda. (Wilde-Wisconsin)
W71-10996

SELENIUM: THE UNKNOWN POLLUTANT,
Environmental Research Group, Ann Arbor, Mich.
Richard Copeland.
Limnos, Vol 3, No 4, p 7-9, 1970. 1 fig.

Descriptors: *Water pollution sources, *Toxicity, *Food chains, Lake Michigan, Zooplankton, Coals, Oils, Gasoline, Air pollution effects, Human diseases, Fallout, Sediments, Aquatic life.
Identifiers: *Selenium, Fossil fuels, Vitamin E, Chicago (Illinois), Combustion.

Selenium, although highly toxic and more poisonous than arsenic or mercury, is necessary for survival of warm blooded animals and man. It replaces vitamin E and prevents certain 'protein malnutrition' diseases; it occurs structurally in many proteins and several amino acids. There is a narrow margin of safety between the necessary dose and toxic dose. Certain plants concentrate selenium in their leaves and stems, killing livestock after ingestion. Selenium rich soils do not occur in the Great Lakes area, but 'fossil fuels', originating from many parts of the world may contain high concentrations of selenium. When the fuels are burned, the resulting ash can become highly enriched in selenium dioxide which, very soluble in water, forms a compound easily assimilated by aquatic organisms. Aquatic organisms and sediment in Lake Michigan, analyzed for various trace elements, show selenium concentration in zooplankton at 7 ppm but the sediment always contains less than .5 ppm, indicating that it is very quickly taken up by organisms. Consequently, several elements, such as selenium, equally toxic as mercury, should be monitored. (Jones-Wisconsin)
W71-10999

D-X SUNRAY OIL CO V BILLUE (OIL POLLUTION OF UNDERGROUND WATER SUPPLY).
For primary bibliographic entry see Field 06E.
W71-11000

THE ROLE OF INORGANIC IONS IN THE EUTROPHICATION OF FARM PONDS,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
Richard W. Terkeltoub.
Typescript; To be published in the Proceedings of the Symposium on Man-Made Lakes, Knoxville, Tennessee, May 1971. 4 tab, 11 ref.

Descriptors: *Eutrophication, *Ions, *Aquatic productivity, Farm ponds, Nutrients, Surfaces, Temperature, Phosphorus, Nitrates, Chlorides, Calcium, Magnesium, Sodium, Potassium, Iron, Manganese, Copper, Algae, Sampling, Chlorophyta.
Identifiers: *Inorganic ions, Zinc, Volvox, Hydrodictyon, Spodylosium, Spirogyra.

Seven eastern Pennsylvania farm ponds were studied to ascertain whether any particular concentrations or ratios of the principal aqueous inorganic ions are associated with eutrophication. The surface and bottom waters were sampled from May 7 to November 18, 1969. Temperature was measured, and calcium, magnesium, sodium, potassium, chloride, nitrate, orthophosphate, iron, manganese, zinc, and copper concentrations were determined. The algae found were Spodylosium, Spirogyra, and Volvox. Water temperatures were usually a few degrees centigrade lower in the bottom waters than in the surface waters. There were no indications of thermal stratification in any pond. The chemical conditions that spurred algal growth in the three ponds, 1, 2, and 7, were not distinguishably different from those present in the algae-free ponds. Similarly, the subsequent decay and disappearance of the algae were not relatable to any of the chemical parameters measured. No discernible set of chemical characteristics differentiated the three ponds that supported algae during the summer from the four ponds that did not. (Jones-Wisconsin)
W71-11001

INCREASED RECOVERY RATE OF SALMONELLAE FROM STREAM BOTTOM SEDIMENTS VERSUS SURFACE WATERS,
Georgia Univ., Athens. Dept. of Microbiology.
For primary bibliographic entry see Field 05A.
W71-11004

POLLUTION POTENTIAL OF SALMONID FISH HATCHERIES,
Kramer, Chin and Mayo, Seattle, Wash.
Paul B. Liao.
Water and Sewage Works, Vol 117, No 12, p 291-297, 1970. 6 fig, 3 tab, 15 ref.

Descriptors: *Water pollution sources, *Fish hatcheries, *Salmonids, Water requirements, Temperature, Nutrients, Algae, Weeds, Taste, Odor, Pathogenic bacteria, Organic wastes, Solid wastes, Chemicals, Michigan, California, Tubificids, Colorado, Water pollution control, Washington, Chemical oxygen demand, Biochemical oxygen demand, Dissolved oxygen, Hydrogen ion concentration, Ammonia, Nitrates, Phosphates, Suspended load, Dissolved solids, Effluents.
Identifiers: Settleable solids, Hatchery effluents, Parasites, Jordan River (Mich), San Joaquin River (Calif), Rifle Falls (Colo), Fish fecal wastes, Residual food, Green River (Wash), Cowlitz Trout Hatchery (Wash).

Water pollution problems associated with salmonid hatchery operations include nutritional enrichment, algae and weed growth, taste, odor, settleable solids, pathogenic bacteria, parasites, organic matter, chemicals and drugs. Fish fecal wastes and residual food are most serious because they are encountered continuously under normal operating procedures; after field testing, these

wastes are classified into organic, nutrient and solid pollutants. The average biochemical oxygen demand (BOD) concentration of hatchery effluents during pond cleaning is several times greater than during normal operation; closely related to BOD, is the dissolved oxygen level. The nutrient pollutants, nitrate and phosphate, are end-products of decomposition of fish food. The hatchery effluent tested may stimulate algal growth and cause algal blooms under certain conditions. The high percentage of suspended and settleable solids indicates that most solids in the cleaning water will be deposited on the stream bottom below the hatchery. Proper feeding would greatly reduce rate of pollutant production. The pollution potential of hatchery cleaning water is comparably to domestic sewage when diluted with infiltration water. Hatchery operating improvements should include proper fish loading techniques, proper feeding procedures, and water supply adjustments. (Jones-Wisconsin)
W71-11006

TOXICITY OF AMMONIA TO MARINE DIATOMS,
Alaska Univ., College. Inst. of Marine Science.
K. V. Natarajan.
Journal of Water Pollution Control Federation, Vol 42, No 5, Part 2, p R184-R190, 1970. 2 fig, 2 tab, 15 ref.

Descriptors: *Toxicity, *Ammonia, *Marine algae, *Diatoms, Chemical analysis, Hydrogen ion concentration, Sea water, Photosynthesis, Phytoplankton, Ammonium compounds, Nutrients, Primary productivity, Fertilizers, Effluents, Water pollution sources, Water pollution effects, Sampling, Temperature, Copepods, Nitrogen, Bacteria, Oxidation-reduction potential, Laboratory tests.
Identifiers: Cook Inlet (Alaska), Cyclotella nana, Leptocylindrus, Pacific Ocean, Aleutian Islands, Prymnesium parvum.

Although the world's fertilizer supply consists largely of ammonium compounds, these compounds are also known to be toxic. Ammonia can become toxic at certain concentrations in the aquatic environment. Effect on marine phytoplankton of a fertilizer plant effluent consisting essentially of ammonia compounds was investigated with both field and laboratory studies. The results of the field experiments showed a close parallel with the laboratory experiments with axenic cultures of marine diatoms. Levels of the effluent toxic to the endemic phytoplankton were between 0.1 and 1% (1.1 and 11 mg/l ammonia). It is evident that the toxicity of ammonia and ammonium salts depends on the concentration of molecular nonionized ammonia or ammonia hydroxide, since the ammonium ion is comparatively nontoxic; (direct experimental observations have not been obtained). Toxic effects of the ammonia effluent to phytoplankton of this investigation can be explained by this phenomenon. (Jones-Wisconsin)
W71-11008

NUTRIENTS AND NUTRIENT BUDGETS IN THE BAY OF QUINTE, LAKE ONTARIO,
Ontario Water Resources Commission, Toronto.
M. G. Johnson, and G. E. Owen.
Journal of Water Pollution Control Federation, Vol 43, No 5, p 836-853, 1971. 8 fig, 7 tab, 37 ref.

Descriptors: *Nutrients, *Lake Ontario, *Eutrophication, Lake Erie, Algae, Nitrogen, Phosphorus, Drainage, Industries, Municipal wastes, Turnovers, Sediments, Human population, Tourism, Watersheds (Basins), Trophic levels, Turbidity, Oxygen, Fish, Recreation, Invertebrates, Rivers, Cyanophyta, Geologic formations, Benthos, Mayflies, Tubificids, Diatoms, Water pollution effects, Water pollution control, Dissolved oxygen, Carbon, Sampling, Equations, Water pollution sources, Rainfall, Midges, Input-output analysis, Mud, Bacteria.
Identifiers: *Nutrient budgets, *Bay of Quinte (Ontario), Nutrient inputs, Chironomus plumosus, Chironomus attentuatus, Chironomus anthracinus, Limnodrilus hoffmeisteri, Tubifex tubifex, Aphanizomenon, Cladophora.

Algal blooms, turbidity, depletion of deep-water oxygen, and changes in composition of the biota are increasingly obvious in Bay of Quinte, Lake Ontario. Clarification of respective significance of nutrient contributions from tributary rivers and from municipal-industrial sources are described. The bay received about 9,700,000 pounds of nitrogen and 700,000 pounds of phosphorus in 1968. 89% of the nitrogen and 60% of the phosphorus were attributable to land drainage and the remainder to municipal-industrial sources. Comparisons based on 'net inputs', the amount of nutrient contained in an input in excess of the amount of nutrient in the equivalent volume of water displaced at the outlet, are proposed. About 50% of the 'net input' of nitrogen and 85% of phosphorus were contributed by municipal-industrial sources in 1968. It is recommended that phosphorus be removed from these sources. The water turnover rate in the bay, five times annually, translocates resuspended nutrients in sediments of the inner bay shallow waters to sediments in deeper waters of the outer bay and Lake Ontario, thus improving water quality. Estimated phosphorus removal cost, $200,000 dollars/year, is justified on the basis of economics income from recreation and tourism. (Jones-Wisconsin)
W71-11009

DIFFERENCES IN ABUNDANCE OF BENTHOS AND RELIABILITY OF ITS ASSESSMENT IN SEVERAL LAKE HABITATS,
Warsaw Univ. (Poland). Chair of Hydrobiology.
Andrzej Prejs.
Ekologia Polska, Seria A, Vol 17, No 7, p 133-147, 1969. 1 fig, 7 tab, 14 ref.

Descriptors: *Benthos, *Estimating, *Sampling, Reliability, Population, Oligochaetes, Distribution patterns, Diptera, Methodology.
Identifiers: *Sampling methods, Milolajskie Lake (Poland), Sniardwy Lake (Poland), Taltowisko Lake (Poland), Chaoborus flavicans.

Tubular pneumatic samplers and Ekman dredges were used to sample benthos organisms of three Mazurian lakes in Poland. In lakes with multispecies composition the differences in the total numbers of Chironomidae and Oligochaeta were relatively slight. In communities with an unbalanced tally of species even a large number of samples proved insufficient to obtain a reliable estimate of the numbers. The use of tubular pneumatic samplers and the Ekman dredges with flaps provided comparably results. The Ekman type sampler with an area of 225 sq cm and a net cover caused displacement of the sediment and yielded grossly diminished results. (Wilde-Wisconsin)
W71-11010

RATIONALE, BACKGROUND, AND DEVELOPMENT OF EXPERIMENTAL LAKE STUDIES IN NORTHWESTERN ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
W. E. Johnson, and J. R. Vallentyne.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 123-128, 1971. 1 fig, 11 ref.

Descriptors: *Lakes, *Investigations, *Eutrophication, Data collections, Ecology, Nutrients, Pollutants, Remedies, Population, Climates, Geology, Toxicity, Bioassay, Sediments, Oligotrophy, Lake Erie, Fish, Limnology, Ecosystems, Productivity, Trophic level, Water pollution effects, Water pollution control, Classification.
Identifiers: *Northwestern Ontario, *Experimental Lakes area, Canadian lakes, Morphometry, Mesotrophic, Manitoba, Cultural eutrophication, Natural eutrophication.

This summarizes the necessity for experimental lake studies and outlines the program planned for the Experimental Lakes Area of Northwestern Ontario. The history, geology, general description, and reasons for choosing these lakes is given. Small natural lakes occupy a position in limnology analogous to that of trial field plots used in agricultural science, that is, a means of assessing effects on a reduced scale. To deal effectively with such complex problems as eutrophication, detailed information on ecosystem responses to environmental modifications can only be provided by field tests. Forty-six lakes were chosen to serve for a better understanding of cultural eutrophication by experimentation involving controlled additions of chemical nutrients and testing of remedial measures. Other nearby lakes are being studied in their natural condition as controls. With the increasing complexity of water pollution problems in modern society, need for controlled studies in areas free from public and industrial interferences increases. The use of small isolated lakes for experimental purposes will immeasurably enhance our knowledge of lakes and efficacy of specific pollution abatement measures. (Jones-Wisconsin)
W71-11011

THE PERIPHYTON OF THE SUBMERGED MACROPHYTES OF MIKOLAJSKIE LAKE,
Warsaw Univ. (Poland). Chair of Hydrobiology.
Lucyna Joanna Bownik.
Ekologia Polska, Vol 18, No 24, p 503-520, 1970. 6 fig, 2 tab, 16 ref.

Descriptors: *Periphyton, *Submerged plants, Biomass, Nematodes, Algae, Oligochaetes, Life cycles, Seasonal, Density, Diatoms, Lakes, Protozoa, Rotifers, Crustaceans, Diptera, Mayflies, Dragonflies, Caddisflies, Mollusks, Cyanophyta, Chrysophyta, Chlorophyta, Pyrrophyta, Invertebrates, Aquatic animals, Littoral, Waves (Water).
Identifiers: *Macrophytes, *Mikolajskie Lake (Poland), Colonization, Potamogeton lucens, Potamogeton perfoliatus, Potamogeton pectinatus, Myriophyllum specatum, Elodea canadensis, Phragmites, Fontinalis, Charales, Ceratophyllum, Lemna.

An analysis was made of the periphyton colonizing Potamogeton lucens, P perfoliatus, Myriophyllum spicatum and Elodea canadensis in Mikolajskie Lake, Poland. Composition and the numbers dynamics of the dominant periphyton groups were recorded indicating that nematodes are dominant with Chironomids and Oligochaeta numerous on submerged vegetation. A great difference was noticed between the numbers dynamics of periphyton fauna colonizing plants living in the lake during winter. The lowest numbers of periphyton fauna were found on plants with a short life cycle, in spring, showing a gradual colonization of a growing plant. On plants with a longer life cycle, periphyton fauna occur in large numbers already in spring but maximum is reached in autumn. The largest density of dominant groups of periphyton organisms was found on Potamogeton lucens, decreasing on Myriophyllum spicatum and Potamogeton perfoliatus; the smallest on Elodea canadensis. In a shore overgrown by plants withering during winter, changes of plant biomass have a decisive influence on periphyton abundance. On plants with longer life cycles, changes of the fauna density determined abundance of periphyton. Algae are more numerous than animal components of the periphyton and diatoms are the most numerous algae. (Jones-Wisconsin)
W71-11012

CHEMICAL CHARACTERIZATION OF POND SEDIMENTS,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.
Benjamin F. Hajek, and Raymond E. Wildung.
Northwest Science, Vol 43, No 3, p 130-134, 1969. 2 tab, 8 ref.

Descriptors: *Chemical properties, *Ponds, *Sediments, Particle size, Interstices, Nutrients, Sorption, Cation exchange, Analysis, Carbon, Humic

acids, Hydrogen, Nitrogen, Calcium, Magnesium, Sodium, Potassium, Ammonia, Aluminum, Hydrogen ion concentration, Analytical techniques, Water pollution effects, Soil chemical properties, Soil analysis, Connate water.
Identifiers: Rattlesnake Springs (Wash).

Relatively little is known of bottom sediments effect on the behavior of various chemical forms of pollutants in the aquatic environment. This investigation was initiated to determine the chemical composition and particle size distribution of sediments and the chemical composition of the sediment interstitial water in an impoundment at the Rattlesnake Springs (Washington) ecology site. It was hypothesized that soils and pond sediments would have several features in common; however, pond sediments and soils differ in that the former are normally left relatively undisturbed by man, and are permanently waterlogged with the oxygen supply severely limited. The sediment humate cation exchange capacity approximates that of the soil humates over the same pH range, indicating that the acidic groups of the soil and sediment isolates may be similar in number and acidic strength. The physiochemical properties of pond sediments and associated interstitial waters were determined using analytical techniques commonly employed in soil science. These techniques gave reproducible results without apparent interference when applied to sediment systems, simplifying future investigations of particulate behavior in the aquatic environment. (Jones-Wisconsin)
W71-11014

PRELIMINARY CHEMICAL CHARACTERIZATION OF WATERS IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
F. A. J. Armstrong, and D. W. Schindler.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 171-187, 1971. 7 fig, 10 tab, 69 ref.

Descriptors: *Lakes, *Chemical properties, *Water analysis, Water chemistry, Calcium, Sodium, Magnesium, Potassium, Sulfates, Chlorine, Carbon dioxide, Color, Conductivity, Pigments, Chlorophyll, Nitrogen, Phosphorus, Seasonal, Silica, Nitrates, Nutrients, Sediments, Ammonia, Dissolved solids, Bicarbonates, Iron, Phosphates, Ions.
Identifiers: *Experimental Lakes area, *Northwestern Ontario.

Mean values for calcium, sodium, magnesium, and potassium on a molar basis were determined by water analyses in 40 small lakes located within the Canadian Shield (northwestern Ontario). Bicarbonate, sulfate, chlorine ions, and total carbon dioxide were measured as well as specific conductance, hydrogen ion concentration, color, plant pigments, dissolved nitrogen, dissolved phosphorus, nitrogen-nitrates and phosphorus-phosphates. Total dissolved nitrogen and phosphorus contents of five lakes were computed at beginning and end of periods during summer stagnation; changes were negligible in three deeper lakes, but the two shallowest showed increases of nitrogen and phosphorus. Calculations of nutrient input and output during the same periods indicated nutrient retention occurred in all; in the two deeper lakes nutrients were apparently lost to sediments, whereas in shallower lakes increases in dissolved nutrients came from the sediments. Analyses were tabulated of 33 other Canadian Shield Lake areas and 13 dilute lakes in other geographical regions; comparison with Experimental Lakes Area lakes shows the latter are more dilute than any in the Shield area except some in Northwest Territories, and much more dilute than any others in the world excepting some California alpine lakes. (Jones-Wisconsin)
W71-11015

SORPTION OF INORGANIC PHOSPHATE BY LAKE SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Lab.
S. S. Shukla, J. K. Syers, J. D. H. Williams, D. E. Armstrong, and R. F. Harris.
Soil Science Society of America Proceedings, Vol 35, No 2, p 244-249, 1971. 3 fig, 4 tab, 31 ref. B-022-WIS.

Descriptors: *Sorption, *Phosphates, *Sediments, Inorganic compounds, Lakes, Calcium carbonate, Hardness (Water), Colloids, Iron, Aluminum.
Identifiers: Ammonia oxalate, Inorganic phosphorus, Wisconsin lakes.

Sediments from softwater and hardwater lakes sorbed between 14% and 100% of the inorganic phosphorus added at levels of 830 and 6700 microgram phosphorus of oven dried sediment. The sorption tended to be inversely related to the calcium carbonate content. Leaching with acid ammonium oxalate annihilated the sorption capacity of noncalcareous sediments and greatly reduced that of calcareous sediments. The oxalate treatment extracted iron and aluminum from noncalcareous sediments and a fraction of iron from calcareous sediments. The phosphorus sorption capacity was related to the content of oxalate-extractable iron. The results suggest that a gel complex of hydrated iron oxide with small amounts of hydrated aluminum silicates and organic matter is the major phosphorus-sorbing component of lake sediments. (Wilde-Wisconsin)
W71-11016

WASTEWATER LOADING GUIDELINES FOR THE GRAND RIVER BASIN.
Ontario Water Resources Commission, Toronto.

Ontario Water Resources Commission, Canada, Interim Report, January 1971. 1 fig, 1 tab, append.

Descriptors: *Waste water (Pollution), *Waste assimilation capacity, *Organic loads, Nutrients, Dissolved oxygen, Aquatic life, Municipal wastes, Photosynthesis, Respiration, Water quality, Streamflow, Agriculture, Industries, Waste treatment, Watersheds (Basins), Phosphorus, Algae, Organic matter, Lake Erie, Effluents, Sewage, Detergents, Plants, Land use, Biochemical oxygen demand, Fisheries, Reservoirs, Pipelines, Estimating, Analysis.
Identifiers: *Loading guidelines, *Grand River Basin (Ontario), Canada, Buffer capacity.

In considering water quality of the Grand River Basin, Ontario, acceptable loadings, based on the new dissolved oxygen criteria adapted by Ontario Water Resources Commission in 1970, upgrade the minimum dissolved oxygen level from 4.0 to 5.0 mg/l in all streams except those supporting cold-water fisheries where minimum dissolved oxygen criteria is 6.0 mg/liter. As a result, previously acceptable waste discharges now exceed present loading guidelines. The phosphorus input, considered the controlling nutrient in algal production, from the municipal sewage treatment plants is estimated as 70% to 80% of the total annual input of this nutrient into the basin. Reduction of nutrient and organic loadings are required for water quality improvement and protection of Lake Erie. Alternatives, including effluent polishing and streamflow augmentation, which can be utilized to increase the potential various river uses, while reducing pollution pressures are considered. In making estimates of acceptable organic loadings, the watershed was divided into eight sub-basins. The loadings for each sub-basin, expressed in terms of five-day biochemical oxygen demand from treatment sources, were determined on basic assumptions, dissolved oxygen criteria, design streamflows, and existing wastewater loadings. Results are tabulated; details appended. (Jones-Wisconsin)
W71-11017

A HYPOTHESIS TO EXPLAIN DIFFERENCES AND SIMILARITIES AMONG LAKES IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 295-301, 1971. 11 fig, 20 ref.

Descriptors: *Lakes, *Biological communities, Meteorological data, Lake morphometry, Nutrients, Ecosystems, Drainage, Nitrogen, Phosphorus, Color, Chlorophyll, Phytoplankton, Productivity, Biomass, Sediments, Oxygen, Carbon, Precipitation (Atmospheric), Denitrification, Decomposing organic matter, Watersheds (Basins), Volume, Mathematical studies, Suspended load, Dissolved solids, Soils, Eutrophication, Measurement, Succession.
Identifiers: *Experimental Lakes area, *Northwestern Ontario (Canada), *Hypothesis.

Morphometric parameters affecting nutrients in the Experimental Lakes Area of Ontario are applied to a preliminary hypothesis to explain biological differences and similarities. Relative quantity of nutrient supplied to lake basin is assumed to be directly proportional to its catchment area (terrestrial portion of the drainage and surface lake area not receiving drainage from other lakes). The long-term average amount of nutrient entering a lake should equal that in precipitation. If the nutrient quantity entering a lake per unit time is directly proportional to catchment area and inversely proportional to volume, the biological productivity level should be proportional to the terrestrial portion of the drainage plus the lake surface area divided by volume. If soils and terrestrial drainage vegetation are relatively homogeneous, lake color should be proportional to area of terrestrial drainage per unit lake surface. If this hypothesis is true, changes in lake morphometry should cause changes in nutrient regime. During years when precipitation and other meteorological conditions are relatively uniform, it could be assumed that lakes with different ratios represent different successional stages thus providing a powerful tool for evaluating artificial enrichment effect. (Jones-Wisconsin)
W71-11019

PRIMARY PRODUCTION AND PHYTOPLANKTON IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO, AND OTHER LOW-CARBONATE WATERS, AND A LIQUID SCINTILLATION METHOD FOR DETERMINING C-14 ACTIVITY IN PHOTOSYNTHESIS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler, and S. K. Holmgren.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 189-201, 1971. 5 fig, 3 tab, 55 ref.

Descriptors: *Primary productivity, *Phytoplankton, *Lakes, *Carbonates, Radioactivity techniques, Systematics, Photosynthesis, Measurement, Nutrients, Classification, Gas chromatography, Carbon dioxide, Chlorophyll, Biomass, Chrysophyta, Standing crop, Lights penetration, Eutrophication, Cyanophyta, Diatoms, Scenedesmus, Chlamydomonas, Euglenophyta, Chlorophyta, Pyrrophyta.
Identifiers: *Experimental Lakes area, *Northwestern Ontario, *Liquid scintillation, *Low-carbonate waters, Canadian Precambrian Shield, Merismopidia punctata, C-14 techniques, Anabaena flos-aquae, Synedra, Bacteriophyta.

The range and general characteristics of phytoplankton standing crop and production values likely to be encountered in a variety of Precambrian Shield lakes in the Experimental Lakes Area (ELA) of northwestern Ontario are reported. Modifications of the carbon-14 technique are outlined which are useful or essential for determining phytoplankton production in waters with low phytoplankton production and low ionic concentrations. The procedure includes techniques for determining filtration error, liquid scintillation counting for radioactivity of membrane filters and stock carbon-14 solutions, and gas chromatography for measuring total carbon dioxide. On two dates in midsummer, primary production, chlorophyll-a, and total carbon dioxide were mea-

sured in several lakes in the ELA together with phytoplankton species abundance and biomass. Chrysophyceae dominated the phytoplankton of most of the lakes. A scheme for lake classification based on phytoplankton species composition and production-depth curves includes three groups: large or exposed lakes with most of the euphotic zone falling within the epilimnion; small, deep, protected lakes, with the euphotic zone extending into a shallow relatively rich hypolimnion; shallow weakly stratified lakes with cell biomass distributed uniformly throughout the water column. (Jones-Wisconsin)
W71-11021

FACTORS AFFECTING PHOSPHATE UPTAKE BY AEROBACTER AEROGENES IN A SYSTEM RELATING CELL NUMBERS TO P-32 UPTAKE,
Defence Research Establishment Suffield, Ralston (Alberta); and Macdonald Coll., Montreal (Quebec). Dept. of Microbiology.
Lloyd A. White, and Robert A. MacLeod.
Applied Microbiology, Vol 21, No 3, p 520-526, 1971. 8 fig, 2 tab, 29 ref.

Descriptors: *Cytological studies, *Phosphates, Absorption, Inhibition, Bacteria, Incubation, Temperature, Laboratory tests, Hydrogen ion concentration, Metabolism, Energy, Radioisotopes.
Identifiers: *Aerobacter aerogenes, Orthophosphates, Arsenate, Metabolic inhibitors.

The glucose nutrient medium buffered at pH 6.55 with N-2-hydroxyethylpiperazine-N'-2-ethanesulfonic acid was found to exert a particularly strong stimulation on the uptake of phosphorus-32 by labeled resting cells of Aerobacter aerogenes. Under optimum conditions, 20,000 cells accumulated detectable amounts of P-32-orthophosphate in 1 hour of incubation. The process was influenced by incubation temperature, concentration of unlabeled orthophosphate, as well as arsenate, and several metabolic inhibitors. (Wilde-Wisconsin)
W71-11022

LIGHT, TEMPERATURE, AND OXYGEN REGIMES OF SELECTED LAKES IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 157-169, 1971. 10 fig, 5 tab, 21 ref.

Descriptors: *Light, *Temperature, *Oxygen, *Lakes, Winds, Wind velocity, Light penetration, Heat budget, Depth, Surface waters, Volume, Thermocline, Epilimnion, Evaporation, Ice, Solar radiation, Color, Primary productivity, Isotherms, Seasonal, Density, Stratification, Photosynthesis, Analytical techniques, Data collections, Hypolimnion, Oligotrophy, Chlorophyll, Phytoplankton.
Identifiers: *Experimental Lakes area, *Northwestern Ontario, Transparency, Back-radiation, Morphometry, Metalimnion, Humic lakes, Polymictic lakes.

Secchi disc, standard photometer and 16-channel spectroradiometer were used to measure light in several Experimental Lakes Area (ELA) lakes. Results of checks upon standard procedure for making subsurface light measurements are presented; light penetration at several wavelengths and total energy flux at several depths are given. Oxygen and temperature isopleths, oxygen depletion winter rates, annual heat budgets, and data on wind effects are presented. Vertical extinction coefficients and Secchi disc visibility were recorded for two lakes. Maximum transmittance shifted toward long wavelengths when transmission coefficients and Secchi disc visibility decreased. Summer and annual heat budgets were large for larger lakes; annual and summer heat incomes were related to mean depth, surface area, and lake volume by simple linear regression equations. Thermocline depth in ELA lakes was set early, and was unchanged during summer until well after lake had reached maximum heat content. Epilimnion temperature followed mean daily air temperature during summer though remaining several degrees higher, resulting from radiant heating. Wind work calculated by Birge's method is of little value, without corrections for back-radiation and evaporation. Oxygen depletion rates under ice were compared in several lakes. This paper contains 21 references. (Jones-Wisconsin)
W71-11025

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS,
Federal Water Quality Administration, Cincinnati, Ohio. Analytical Quality Control Lab.
D. G. Ballinger, and G. D. McKee.
Journal Water Pollution Control Federation, Vol 43, No 2, p 216-227, 1971. 6 fig, 4 tab, 16 ref.

Descriptors: *Bottom sediments, *Chemical properties, *Classification, Chemical analysis, Analytical techniques, Organic matter, Water quality, Water pollution effects, Water pollution sources, Estuaries, Lakes, Carbon, Nitrogen.
Identifiers: *Organic sediment index, Organic nitrogen, Organic carbon.

The contents of organic carbon and total nitrogen were determined in more than 200 sediment samples collected from streams, lakes, and estuaries. The percentages of these two constituents were used to classify sediments into four types, 0.2% total nitrogen and about 5% organic carbon ordinates forming the division lines. The product of the percentages of carbon and nitrogen was designated as an index of organic nature of the sediment 'Organic Sediment Index'. The latter values were correlated with stream loading and flow characteristics. This paper contains 16 references. (Wilde-Wisconsin)
W71-11026

THE LITTORAL BENTHIC FAUNA OF LAKE ST LOUIS NEAR MONTREAL (QUEBEC). I. SOME GENERAL DATA, (In French with English summary),
Montreal Univ. (Quebec) Dept. of Biological Sciences.
Etienne Magnin.
Annales d'Hydrobiologie, Vol 1, No 2, p 179-193, 1970. 6 fig, 4 tab, 8 ref.

Descriptors: *Eutrophication, *Benthic fauna, *Littoral, Lakes, Sampling, Animal populations, Annelids, Mollusks, Water pollution sources.
Identifiers: St Louis Lake (Quebec), Montreal Island (Canada), Arthropods, Bithynia tentaculata, Gammarus fasciatus.

Sampling of benthos of St Louis Lake bounded on the north by Montreal Island (Canada) was accomplished by a modified Ekman dredge, a Ponar dredge, and a Gerking cage. Molluscs and crustaceans were the most important representatives of the littoral fauna; Bithynia tentaculata, Gammarus fasciatus, Hyalella azteca, Asellus, and Lirceus were particularly abundant. On the average, 7500 organisms per sq m were collected near the shore and 4500 sq m at 100 m from the coastline. The results of chemical analyses indicated an advanced eutrophication, effected in part by the inflow of alkaline waters of the St Lawrence River. (Wilde-Wisconsin)
W71-11027

CHEMICAL FACTORS INVOLVED IN THE CONTROL OF PHYTOPLANKTON PRODUCTION IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
Mitsuru Sakamoto.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 203-213, 1971. 12 fig, 3 tab, 26 ref.

Descriptors: *Chemical properties, *Phytoplankton, *Productivity, Lakes, Nutrients, Carbon, Chemicals, Iron, Phosphorus, Nitrogen, Chlorophyll, Trace elements, Chelation, Photosynthesis, Carbon dioxide, Calcium, Magnesium, Sodium, Potassium, Hydrogen ion concentration, Biocarbonates, Vitamins, Manganese, Copper, Molybdenum, Chlorides, Cyanophyta.
Identifiers: *Experimental Lakes area, *Northwestern Ontario, NTA, Zinc, HEDTA.

The relative importance of various nutrients controlling phytoplankton production in the Experimental Lakes Area of northwestern Ontario was studied. In short-term experiments (6 hours - 3 days) the general order of decreasing importance of nutrients added individually to lake water samples containing phytoplankton was inorganic carbon, iron, phosphorus, and nitrogen. The comparable order for long-term experiments (8 - 20 days) was phosphorus, iron, nitrogen; or phosphorus, nitrogen, iron. No relation was found between concentrations of chlorophyll and inorganic carbon. The dominant algae at time of collection are given. In interpreting results, it is noted that they pertain to laboratory conditions. The addition of iron and trace elements in chelated form and chelators (HEDTA, NTA) alone, increased photosynthetic carbon uptake. On the basis of these results, it is difficult to make exact statements about the relative importance of phosphorus, nitrogen, iron, and inorganic carbon. The physiological significance of iron or a trace element deficiency is quite different from a deficiency of carbon, nitrogen, or phosphorus since the last three serve as major cell structural components. The iron deficiency was mostly due to lack of iron in readily assimilable form. This paper contains 26 references. (Jones-Wisconsin)
W71-11028

PERIPHYTON OF THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
John G. Stockner, and F. A. J. Armstrong.
Journal Fisheries Research Board of Canada, Vol 28, No 2, p 215-229, 1971. 9 fig, 2 tab, 37 ref.

Descriptors: *Periphyton, *Algae, *Littoral, Light penetration, Benthic flora, Lakes, Depth, Diatoms, Chlorophyta, Cyanophyta, Biomass, Chemical analysis, Statistical methods, Nitrogen, Phosphorus, Chlorophyll, Distribution, Carbon, Seasonal, Caddisflies, Gastropods, Sands, Chrysophyta.
Identifiers: *Experimental Lakes area, *Northwestern Ontario, Epilithic algae, Achnanthes minutissima, Achnanthes flexella, Eunotia pectinalis, Desmids.

Since the littoral zone of the four lakes studied in the Experimental Lakes Area (ELA) of Northwestern Ontario was composed chiefly of large boulders and rock shelfs, the epilithic algal assemblage of periphyton was dominant. Diatoms were the dominant group within the epilithic assemblage. Benthic algal growth in most lakes was negligible at depths over 10 meters. Filamentous green and blue-green algae increase significantly in July and August but never constituted more than 40% of total algal biomass. A well—defined diatom succession occurred. achnanthes minutissima was the most abundant diatom in littoral zones of all lakes. Vertical distribution of littoral diatoms was examined in lake 240 and species differences are discussed in light of possible regulating mechanisms. Achnanthes flexella and Eunotia pectinalis were found only in the psammonal habitat of lake 240. Statistical treatment of chemical analyses of nitrogen, phosphorus, and chlorophyll-a content of periphyton showed no significant difference in amounts of total nitrogen, but distribution of both total phosphorus and chlorophyll-a was significantly different. Comparisons among lakes are made, and role of nitrogen and phosphorus as regulators of periphyton growth in ELA lakes is discussed. This paper contains 37 references. (Jones-Wisconsin)
W71-11029

COMPARISON OF THE PRIMARY PRODUCTION OF PHYTOPLANKTON IN THREE LAKES OF DIFFERENT TROPHIC TYPE,
Institute of Ecology, Warsaw (Poland), Dept. of Hydrobiology.
Anna Hillbricht-Ilkowska, and Irena Spodniewska.
Ekologia Polska, Seria A, Vol 17, No 14, p 241-261, 1969. 4 fig, 5 tab, 43 ref.

Descriptors: *Primary productivity, *Phytoplankton, *Lakes, Trophic level, Spatial distribution, Biomass, Photosynthesis, Degradation (Decomposition), Nannoplankton, Eutrophication, Dystrophy, Population, Oxygen, Light, Temporal distribution.
Identifiers: Hikolajskie Lake (Poland), Sniardwy Lake (Poland), Flosek Lake (Poland).

The total production of phytoplankton of two eutrophic lakes in the Mazurian region of Poland for a 150-day period ranged from 2500 to 2100 kcal/sq m, whereas that of a dystrophic lake was 1300 kcal/sq m. Light utilization effectiveness was correspondingly 0.48, 0.40, and 0.24%. The maximum phytoplankton photosynthetic activity was recorded during spring and fall in eutrophic lakes and during the summer in dystrophic lake. The biomass of nannoplankton was indirectly related to the degree of eutrophication. The absence of blue-green algae and the predominance of dinoflagellates was a distinguishing characteristic of the dystrophic lake. The average decomposition rate was similar in all three lakes and formed about 65% of the total gross primary production. This paper contains 43 references. (Wilde-Wisconsin)
W71-11030

THE OLIGOCHAETE FAUNA OF GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
Richard P. Howmiller, and A. M. Beeton.
Proceedings 13th Conference on Great Lakes Research, p 15-46, 1970. 31 fig, 3 tab, 39 ref.

Descriptors: *Oligochaetes, *Indicators, *Distribution patterns, *Eutrophication, Lake Michigan, Tubificids, Water pollution effects, Benthic fauna, Great Lakes, Sampling, Population.
Identifiers: *Green Bay (Wis), Lumbriculidae, Naididae.

The bottom of Green Bay, an arm of Lake Michigan, was sampled at 103 stations, using Ponar and Ekman grabs. The populations of Oligochaeta, including Lumbriculidae, Naididae, and Tubificidae sp, comprised from 50% to 60% of the benthic macroinvertebrates. The presence of Stylodrilus heringianus and Tubifex kessleri was characteristic for the northern, less eutrophied part of the bay. The polluted lower end was dominated by Limnodrilus sp, particularly L hoffmeisteri, with occasional presence of Dero digitata. Decreased eutrophication coincided with frequent occurrence of Aulodrilus americanus, A pluriseta, Ilyodrilus templetoni, Peloscolex freyi, and P multisetosus. The results of the study support the thesis that the distribution pattern of oligochates serves as a sensitive indicator of organic pollution and subsequent degree of water oxygenation. This paper contains 39 references. (Wilde-Wisconsin)
W71-11031

ALGAL GROWTH ASSESSMENT IN NATURAL WATERS,
Illinois State Water Survey, Peoria. Water Quality Section.
Wun-Cheng Wang, and William T. Sullivan.
Typescript; Presented at 14th Conference on Great Lakes Research, April 19-21, 1971.

Descriptors: *Forecasting, *Algae, *Plant growth, *Eutrophication, Growth rates, Sampling, Lake Michigan, Measurement, Suspended load, Alkalinity, Hardness (Water), Analytical techniques, Ammonia, Nitrates, Phosphates, Water quality, Nitrogen, Nutrients, Trophic level.
Identifiers: Algal growth potential, Illinois River (Ill), Diagnostic criterion.

Methods are described for diagnostic and predictive evaluation of natural water quality based on algal growth potential. Techniques for measurement of algal growth were investigated and algal nutrition examined. After removal of plankton by membrane filtration, samples were inoculated with a natural, mixed algal culture; growth was satisfactory measured by increases in light absorbance and filterable organic and inorganic mass and by decreases in alkalinity and hardness. Algal pigment fluorescence was not comparable to the other parameters above oligotrophic levels, possibly due to inadequate extraction of fluorescent compounds. Maximum daily algal growth was attained in three to five days following inoculation; ammonia was preferred to nitrates as a nitrogen source. Ratio of filterable inorganic mass to organic mass increased with higher initial sample concentrations of alkalinity and hardness. 'Algal Growth Potential', representing the trophic level of a natural water source, was best represented by weight of filterable organic mass produced after seven days of incubation. Lake Michigan at the Chicago Central Water Filtration Plant was judged essentially oligotrophic, while the Illinois River near Peoria is eutrophic. This paper contains 17 references. (Jones-Wisconsin)
W71-11033

DREDGING: PROBLEMS AND REMEDIES,
Corps of Engineers, Buffalo, N.Y.
Ray S. Hansen.
Limnos, Vol 4, No 1, p 3-12, 1971. 5 fig, 7 ref.

Descriptors: *Dredging, *Great Lakes, Harbors, Phosphorus, Waste treatment, Sediments, Water pollution sources, Water pollution control, Ultimate disposal, Water quality, Legislation, Permits, Biota, Physical properties, Chemical properties, Costs, Dikes, Suspended load, Dissolved solids, Rivers and Harbors Act, Cost sharing, Federal project policy, Soluble solids, Nutrients.
Identifiers: *Dredgings disposal, Mercury, Corps of Engineers.

This is an examination of the ecological ramifications of dredging and disposal in the Great Lakes. Water and sediments in harbors, open-lake dumping areas, and newly constructed disposal sites were sampled as well as material from sources related to dredges, dikes, barriers, etc, for analysis of physical and chemical properties possibly affecting biota and water quality. Relation of dredging to pollutants, especially mercury, was considered. Several processes and combinations of processes for treatment of dredged material were studied. Most 'treatment' processes are not very effective for removal of many pollutants, such as heavy metals. Disposal behind enclosed dikes is expensive, but generally is less costly than other means of handling dredging except lake disposal. Factors of design, composition, and location of diked areas vary widely in different localities (disposition of dredged material on land or in marshy areas may harm wildlife and the environment; filled-in areas might be used beneficially). 'Benefits' of halting open-lake disposal include improvements in the ecological environment where polluted dredgings are deposited, removal of some undesirable sediment material which could penetrate the ecosystem, and the advantage of reducing trubidity, odor, and oil slicks which appear during open-lake disposal. (Jones-Wisconsin)
W71-11035

CRITICS WEIGH EPA HERBICIDE REPORT, FIND IT WANTING,
Constance Holden.
Science, Vol. 173, No. 3994, p 312, 23 July 1971.

Descriptors: *Herbicides, *2-4-5-T, *Standards, *Regulation, Water pollution effects, Environmental effects, Aquatic environment, Water quality, Water pollution, Degradation, Chemical degradation, Absorption, Cost-benefit theory.
Identifiers: *Dioxin, Teratogenic agents, Environmental Protection Agency, Chronic pollution, Threshold dose, Birth defects, Stillbirths.

The herbicide 2,4,5-T, which is contaminated with an extremely potent animal teratogen (dioxin), has been the subject of controversy for over two years. The Environmental Protection Agency (EPA), therefore, commissioned a study upon which to base regulation of the herbicide's use. All but one member of the ten-man board recommended that present restrictions be lifted. The report has not been made public and is apparently 'not suitable' for publication. The Committee for Environmental Information (CEI) and several individuals have challenged the EPA report. Their five major points of contention are summarized. (LeGore-Washington)
W71-11037

EFFECTS OF ANTIMYCIN A ON TISSUE RESPIRATION OF RAINBOW TROUT AND CHANNEL CATFISH,
Bureau of Sport Fisheries and Wildlife, LaCrosse, Wis. Fish Control Lab., and Viterbo College, LaCrosse, Wis.
Richard A. Schoettger, and Gerald E. Svendsen.
U.S. Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control No. 39, May 1970. 10 p, 3 tab, 22 ref.

Descriptors: *Fish physiology, *Biochemical oxygen demand, *Oxygen requirements, *Respiration, *Animal metabolism, *Antimycin A, *Fish control agents, Dissolved oxygen, Rainbow trout, Channel catfish, Bioassay, Environmental effects, Biochemistry, Animal physiology, Physiological ecology, Environmental effects, Metabolism.
Identifiers: *Drug effects, Drugs, Liver, Kidney, Brain, Gills, Salmo sp., Ictalurus sp.

Effects of Antimycin A on respiration of liver, kidney, brain and gill of rainbow trout and channel catfish were measured in vivo and in vitro. In vitro, brain tissue was most resistant to the toxicant, followed by liver and kidney. Brain was more sensitive in vivo than in vitro; liver and kidney were less sensitive in vivo than in vitro. Untreated trout tissues had higher rates of respiration than did catfish tissues. Liver had the greatest oxygen consumption of all tissues. (LeGore-Washington)
W71-11039

A RESUME OF FIELD APPLICATIONS OF ANTIMYCIN A TO CONTROL FISH,
Bureau of Sport Fisheries and Wildlife, LaCrosse, Wis. Fish Control Lab.
Robert E. Lennon, and Bernard L. Berger.
U.S. Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control No. 40, May 1970. 19 p, 5 tab, 40 ref.

Descriptors: *Fish physiology, *Fishkill, *Fish management, *Fish control agents, *Antimycin A, *Antibiotics, Mortality, Morbidity, Lethal limit, Fish conservation, Fish farming, Public health, Water quality, Aquatic animals, On-site tests, Potassium compounds.
Identifiers: *Drug effects, Drugs, Detoxification, Potassium permanganate.

More than 50 applications of Antimycin A, a fish toxicant, have been made to control fish in the field. It has been used for partial reclamation and as a general or selective toxicant. It is effective against fish in fresh and in marine waters, in acid and in alkaline waters, in cold and in warm waters, and in flowing and in static waters. The formulations contribute no color or odor to water and do not repel fish. The toxic action, respiratory inhibition, is irreversible in most fish. Fish-killing concentrations are harmless to most aquatic invertebrates and to higher vertebrates. Highlights of the field applications are presented. (LeGore-Washington)
W71-11040

POTENTIAL TOXICITY OF KRAFT MILL EFFLUENT AFTER OCEANIC DISCHARGE,
Oregon State Univ., Corvallis. Engineering Experiment Station; and Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.

Robert C. Courtright, and E. Carl Bond.
Progressive Fish culturist, Vol. 31, No. 4, p 207-212, October 1969. 5 fig, 2 tab, 9 ref. FWPCA Grant No. WP-524.

Descriptors: *Water pollution effects, *Lethal limit, *Water pollution sources, *Pulp wastes, *Lignins, *Toxicity, *Sculpins, Bioassay, Organic wastes, Pulp and paper industry, Wood wastes, Resistance, Salt tolerance, Fish diseases, Fishkill, Mortality, Morbidity, Fish physiology, Industrial wastes, Marine fish.
Identifiers: *Kraft mill effluent, Oligocottus sp.

The foam caused by precipitation of lignins in kraft mill effluent (KME) is known to contain toxic fractions. A particular problem probably exists in tidepools, hence a tidepool inhabitant, the fluffy sculpin (Oligocottus snyderi), was selected as a static bioassay subject. A 64 hr median tolerance limit of 9% KME are 18-30 ppt salinity was determined. Low temperatures apparently encourage the resistance of the sculpins to KME, but the effect is not entirely arrested. The extreme variability of KME is noted. (LeGore-Washington)
W71-11042

THE ACCUMULATION OF DDT BY THE DRAGONFLY NYMPH, TETRAGONEURIA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering; and North Carolina Univ., Chapel Hill. School of Public Health.
Frank G. Wilkes, and Charles M. Weiss.
Transactions of the American Fisheries Society, Vol 100, No 2, p 222-236, April 1971. 10 fig, 24 ref.

Descriptors: *DDT, *Chlorinated hydrocarbon pesticides, *Absorption, *Dragonflies, *Animal physiology, Bioassay, Aquatic insects, Carbon radioisotopes, Pesticide residues, Pesticide kinetics, Water pollution effects, Agricultural chemicals, Physiological ecology, Environmental effects, Tracers, Path of pollutants.
Identifiers: *Insect physiology, Nymphs, Tetragoneuria sp.

Final instar Tetragoneuria spp. dragonfly nymphs were exposed to sublethal concentrations of DDT-C-14 dispersed in water. The accumulation of DDT from the water by both live and dead nymphs as a function of DDT concentration and exposure time was determined by liquid scintillation analysis. The DDT accumulation of the live nymphs increased exponentially with increased concentration at a given exposure time. At a given concentration, accumulation increased with increased exposure time. The DDT accumulation of the live nymphs greatly exceeded that of the dead nymphs at the higher DDT concentrations studied. It is indicated that both biological and physical mechanisms contribute to DDT uptake by the organism and the rates of uptake by these mechanism are concentration dependent. (LeGore-Washington)
W71-11043

NOTE ON THE ESCAPE RESPONSE OF THE SEA URCHIN, STRONGYLOCENTROTUS DROEBACHIENSIS, TO INORGANIC SALTS,
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology; and Newcastle-upon-Tyne Univ. (England). Dove Marine Lab.
Fu-Shiang Chia.
Canadian Journal of Zoology, Vol 48, No 3, p 589-590, 1970. 1 tab, 4 ref.

Descriptors: *Water pollution effects, *Salts, *Potassium compounds, *Sodium compounds, *Copper sulfate, *Animal behavior, Water quality, Environmental effects, Invertebrates.
Identifiers: *Escape response, *Sea urchins, *Zinc compounds, *Avoidance, Strongylocentrotus sp., Marthasterias sp., Starfish.

Several sea urchins, Strongylocentrotus droebachiensis, were exposed to several inorganic salts, including KCl, K2SO4, Na2SO4, ZnSO4, and CuSO4. In all cases the escape response was the same type and of the same order of magnitude as when individuals were exposed to the predatory starfish, Marthasterias glacialis. Tube feet are immediately retracted, the spines are bent toward the irritant, and the globiferous pedicellariae with open jaws are raised. Movement away from the area begins in 5-10 sec. Mechanical stimulation did not cause such a reaction. (LeGore-Washington)
W71-11044

THE EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS. LITERATURE SUMMARY AND RESEARCH NEEDS,
Maryland Univ., Solomons. Natural Resources Inst.
J. AJ. Albert Sherk, Jr.
Natural Resources Institute of the University of Maryland, Contribution No. 443, February 1971. 73 p, 157 ref. U.S. Army Corps of Engineers Contract No. DACW73-70-C-0013.

Descriptors: *Reviews, *Publications, *Water pollution effects, *Sedimentation, *Turbidity, *Sediment load, *Waste disposal, Bibliographies, Information retrieval, Water quality, Aquatic environment, Environmental effects, Physiological ecology, Impaired water quality, Suspension, Biological communities.
Identifiers: *Sedimentation effects, Biological systems, Filter-feeding organisms, Offshore waste disposal.

Publications on the biological effects of turbidity, suspended sediment loads, and siltation (sediment deposition) in estuaries are not numerous. Two important concepts which are implicit in many discussions of the biological effects of suspended loads and deposited sediments are: (1) that each site selected for engineering change has inherent physical, chemical and biological limits beyond which significant effects will occur, and (2) the sediment loads and deposited sediments may be expected to affect living systems in a number of different ways. This review collects pertinent information in an attempt to provide a basis upon which to assess the various effects. Included are sections on sediment effects on biological systems, sediment effects on filter-feeding organisms, offshore waste disposal, and research needs. (LeGore-Washington)
W71-11045

THE DISTRIBUTION OF THE MAJOR AND SOME MINOR ELEMENTS IN MARINE ANIMALS. I. ECHINODERMS AND COELENTERATES,
Liverpool Univ. (England).
For primary bibliographic entry see Field 05A.
W71-11046

A WATER HARDENER FOR EXPERIMENTAL USE,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 09C.
W71-11047

SHORT TIME FLUCTUATIONS OF THE MICROFAUNA IN A ROCKPOOL IN THE NORTHERN BALTIC PROPER,
Stockholm Univ. (Sweden). Asko Lab.
Bjoern Ganning.
Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven, Vol 2, p 149-154, 1966. 5 fig, 4 ref.

Descriptors: *Water pollution effects, *Salinity, *Fluctuation, Water quality, Environmental effects, Physiological ecology, Aquatic animals, Brackish water, Lethal limit, Bioassay, Bioindicators, Saline water systems.
Identifiers: *Rockpool, *Ostracods, Sweden, Tidepool, Heterocypris sp.

The author describes the typically poorly diversified fauna of a tidepool on the Swedish east coast. To determine tolerance to salinity fluctuations, ostracods (Heterocypris salinus) were challenged in static bioassay with eight gradations of salinity from 0.0 to 30 ppt. At 0.0 ppt and at 30 ppt all animals died within 7 days. At 15 ppt the ostracods apparently adapted, and the most favorable salinity was 10 ppt. (LeGore-Washington)
W71-11049

THE TOXICITY OF RESIDUAL WATERS RESULTING FROM THE SUGAR INDUSTRY APPRAISED BY TESTS ON YOUNG PLANTS (IN RUMANIAN),
Institutul de Medicina si Farmacie, Iasi (Rumania). Catedra de Igiena.
Simona Apostol, C. Melinte, and Viorica Gavat.
Summaries in French, English, German and Russian. Revista Medico-Chirurgicala a Societatii de Medici si Naturalisti din Iasi, Vol. 74, No. 2, p 413-420, April-June, 1970. 4 fig, 7 ref.

Descriptors: *Water pollution sources, *Water pollution effects, *Bioassay, *Industrial wastes, Standards, Regulation, Bioindicators, Lethal limit, Carbohydrates, Environmental effects, Toxicity, Pollutants, Effluents, Organic wastes.
Identifiers: *Saponin, *Sugar processing, Food processing.

The noxious effect of the residual waters from a sugar factory and of different saponin concentrations was appraised by their toxicity for young plants and by germination tests. The residual waters proved particularly toxic, especially those coming from the press. Saponin was toxic in concentrations of less than 0.2 mg/l, the maximum limit presently permissible in Rumania. (LeGore-Washington)
W71-11050

MODEL ECOSYSTEM FOR THE EVALUATION OF PESTICIDE BIODEGRADABILITY AND ECOLOGICAL MAGNIFICATION,
Illinois Univ., Urbana. Dept. of Zoology; and Illinois Univ., Urbana. Dept. of Entomology.
For primary bibliographic entry see Field 05B.
W71-11067

RADIOACTIVE WASTE DISCHARGES TO THE ENVIRONMENT FROM A NUCLEAR FUEL REPROCESSING PLANT,
Environmental Protection Agency, Washington, D.C.; and Bureau of Radiological Health, Rockville, Md.
For primary bibliographic entry see Field 05B.
W71-11074

INFLUENCES OF SEDIMENTATION ON WATER QUALITY: AN INVENTORY OF RESEARCH NEEDS.

Journal of the Hydraulics Division, ASCE Proceedings, Vol 97, No HY8, Paper 8325, p 1203-1211, August 1971. 9 p.

Descriptors: *Sedimentation, *Water quality, *Reservoir silting, Water quality control, Limnology, Urbanization, Water pollution effects, Water pollution sources, Reviews, Water chemistry.

Sediments play a predominant role in determining the quality of water. Their physical influence not only ranks as a major pollutant but they also serve as a transporting or catalytic agent. This capability can both amplify or diminish the severity of other forms of pollution. An ASCE Sedimentation Committee task group was assigned the responsibility of identifying and cataloging these many diverse influences plus evaluating the priority of research needs. Fifty-four authoritative respondents, representing many professional disciplines, contributed 196 specific comments on research needs. A condensed and paraphrased summation of these comments, by 11 categories, expresses their viewpoints. The extremely broad and varied range of

problem areas establishes that an interdisciplinary approach is necessary to both define research needs and formulate acceptable problem solutions. Recommendations are outlined that are believed paramount toward satisfying future professional needs.
W71-11077

SAMPLING AND MEASUREMENT IN THE AQUATIC ENVIRONMENT,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 05A.
W71-11084

THE ENHANCEMENT OF VIRAL INACTIVATION BY HALOGENS,
Johns Hopkins School of Hygiene and Public Health, Baltimore, Md. Dept. of Environmental Health.
For primary bibliographic entry see Field 05B.
W71-11085

ENVIRONMENTAL EFFECTS OF OIL POLLUTION,
Environmental Protection Agency, Washington, D.C. Water Quality Office.
Thomas A. Murphy.
Journal of the Sanitary Engineering Division, ASCE Proceedings, Vol 97, No SA3, Paper 8221, p 361-371, June 1971. 11 p, 67 ref.

Descriptors: *Oily water, *Environmental effects, *Water pollution effects, Surveys, Reviews, Oceans, Poisons, Path of pollutants, Pollutant identification, Economics, Legal aspects, Social aspects, Regulation, Legislation.
Identifiers: *Oil spills.

Until recently, oil pollution has been considered a hazard primarily for its visible effects on birds and beaches. However, greater resources damage may occur from the less visible effects of spilled oil on marine life. These effects are a complex result of the type and quantity of oil and circumstances of the spill. A recent, moderately-sized spill of distillate fuel off Cape Cod caused extensive damage to many types of coastal marine life, including a massive initial kill and uptake and persistence of oil in sediments and in tissues of shellfish. A review of the literature indicates that these observations were not unique, but had been observed with previous spills, depending on the type of oil and how much was dispersed into the water column. More damage may be occurring to marine life from oil spills, especially chronic spills, than has been previously assumed. Proper observation and investigation is required to reveal this damage.
W71-11088

ACCUMULATION OF DDT BY DAPHNIA MAGNA,
California Univ., Davis. Dept. of Environmental Toxicology.
For primary bibliographic entry see Field 05B.
W71-11221

THE ENHANCED PRESERVATION OF ORGANIC MATTER IN ANOXIC MARINE ENVIRONMENTS,
Washington Univ., Seattle. Dept. of Oceanography.
Francis A. Richards.
In: Symposium on Organic Matter in Natural Waters, University of Alaska, College, Sept 2-4, 1968: Institute of Marine Science Occasional Publication No 1, p 399-411, June 1970. 13 p, 3 tab, 21 ref. NSF Grant GA 644.

Descriptors: *Biodegradation, *Oxygen demand, *Toxicity, *Water properties, *Anaerobic conditions, Dissolved oxygen, Sea water, Stagnant water.
Identifiers: Anoxic marine water, Black Sea.

The effects of the decomposition of organic matter on the composition of sea water in marine systems with limited circulation are reviewed. Specific attention is given to basins and fiords when the circulatory replacement of oxygen is less than the biological-biochemical oxygen demand, and as a result, all the oxygen is consumed and anoxic conditions arise. Examples of such systems are the Black Sea, the Cariaco Trench, Saanich Inlet and Lake Nitinat. There is no clear-cut evidence that the preservation of organic matter is enhanced by anoxic conditions in marine environments. The greater quantities of organic matter in the sediments underlying anoxic sea waters may well represent faster rates of sedimentation and accumulation, rather than slower rates of organic decomposition. The relatively large concentrations of organic matter in the waters of the Black Sea and Lake Nitinat may similarly represent different dynamic equilibria among primary production, settling rates and rates of organic decomposition than prevail in open ocean systems. (See also W71-11226) (Knapp-USGS)
W71-11242

WATER AND OREGON'S ECOLOGY.
Oregon State Univ, Corvallis.
For primary bibliographic entry see Field 05B.
W71-11260

PESTICIDES AND GROUND WATER,
Oregon State Univ., Corvallis, Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W71-11261

WATER QUALITY IN THE LOWER WILLAMETTE,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W71-11262

LIFE AND POLLUTION IN GREAT SOUTH BAY,
Offshore/Sea Development Corp, New York.
George Claus.
Underwater Naturalist, Vol. 7, No. 1, p. 11-16, 1969.

Descriptors: *Coasts, *Estuaries, *Water pollution sources, Human population, Fertilizers, Phosphates, Pesticides, Sewage, Water pollution effects, Fisheries, Shellfish, Oysters, Clams, E. coli, Circulation, Productivity, Nutrients, Eutrophication.
Identifiers: Great South Bay.

The population explosion and the large amounts of waste generated by this population have increased the demand for the use of coastal waters, estuaries and tributaries both as discharge basins and recreational facilities. This same population wants clean water for swimming, fisheries and aesthetics. While rhetoric and politics deal with the conflict the marine environment continues to rapidly deteriorate. The future of Great South Bay is considered and possible conservation measures are discussed. A sewer system throughout the Island, waste treatment equipment for all boats, dredging and an end to construction in the area is needed if Great South Bay is to be saved. (Ensign-PAI)
W71-11269

EFFECTS OF SALINITY AND WATER QUALITY ON SURVIVAL AND GROWTH OF JUVENILE POMPANO, TRACHINOTUS CAROLINUS,
Louisiana State Univ., Baton Rouge. Div. of Fisheries.
For primary bibliographic entry see Field 02L.
W71-11280

DEVELOPMENT OF RATIONS FOR ECONOMICALLY IMPORTANT AQUATIC AND MARINE INVERTEBRATES,
Louisiana State Univ., Baton Rouge. Div. of Fisheries.
For primary bibliographic entry see Field 02L.
W71-11281

THE 50-MILE BALLAST-OIL DUMPING PROHIBITED ZONE OFF ALASKA, RECONSIDERED IN THE LIGHT OF AVAILABLE DATA CLEANED FROM SIGNIFICANT INCIDENTS,
Federal Water Quality Administration, Corvallis. Pacific Northwest Water Lab.
M. H. Feldman.
Working Paper No 77, October, 1970. 24 p, 1 fig, 12 ref.

Descriptors: *Water pollution sources, *Oily water, *Alaska, *Oil wastes, Oil industry, Shores, Marine animals, Environmental effects, Biological treatment, Dispersion, Waste disposal.
Identifiers: 50-mile dumping prohibited zone.

The Santa Barbara oil spill of 1969 provided a detailed biological and ecological analysis of the effects of oil dumping. The Torrey Canyon oil spill left an aftermath of biological detergent damage, to which birds were the most vulnerable. Cook Inlet, Alaska, is subject to long-term seep and short-term acute accidental input of petroleum, but natural degradation and the turbulent tidal situation adequately takes care of the total annual input. Off San Juan, Puerto Rico, 30,000 tons of crude were deposited, and at Buzzards Bay, Massachusetts, a barge carrying diesel fuel went aground and indications are that oil in sediments at depth are causing the death of bottom organisms. There is little information available on the treatment of oils in a marine environment, therefore it is essential to identify and quantify all sources of petroleum pollution in Alaska, especially in view of its great temperature differences. The physical chemistry of any dispersants used will have to be related to the crude on which they are operant and to the marine environment. Petroleum products are still washing into shore waters despite the 50-mile dumping limit and causing economic, aesthetic and environmental damage, so an empirical approach to discharge in Alaskan waters seems indicated. (Smith-PAI)
W71-11291

SUMMARY OF THE OCEANOGRAPHY AND SURFACE WIND STRUCTURE OF THE PACIFIC SUBARCTIC REGION IN RELATION TO WASTE RELEASES AT SEA,
Federal Water Quality Administration, Corvallis. Pacific Northwest Water Lab.
Richard J. Callaway.
Working Paper No 76, September, 1970. 72 p, 56 fig, 1 tab 9 ref.

Descriptors: *Water pollution effects, *Waste disposal, *Sea water, Coasts, Subarctic, Alaska, *Oil wastes, Oily water, Ocean currents, Ocean circulation, Winds.
Identifiers: 50-mile dumping prohibited zone.

The physical oceanography and surface wind structure of the Gulf of Alaska and waters adjacent to the Alaskan Pacific Coast are outlined in order to evaluate the efficacy of the 50-mile oil discharge limit, especially where large volumes of non-degradable types of waste are concerned. The geography, surface and subsurface currents, and temperature-salinity relationships of the Subarctic Pacific have been well defined. The continental shelf area is shown on bathymetric charts, and the movements of currents have been deduced from drift bottle releases which are good indicators of the path likely to be followed by solids and surface debris. Figures are used to show surface circulation and current density, direction and speed, but wind effects must be taken into account when estimating the drift of waste discharge, and the normally prevailing wind speed and direction are shown for

each month of the year. An international oceanographic expedition of the North Pacific in 1955 collected data which showed that the coastal zones are highly productive of nutrients, zooplankton, fish larvae and marine mammals, therefore highly susceptible to pollution damage. It is concluded that the 50-mile zone is an ineffective arbitrary limit and that there is, in fact, no really safe place to dump waste at sea. (Smith-PAI)
W71-11292

THE EFFECTS OF AGE AND WATER FLUCTUATIONS ON THE LIMNOLOGICAL FACTORS OF IMPOUNDED WATERS,
Mississippi State Univ., State College. Water Resources Research Inst.
For primary bibliographic entry see Field 02H.
W71-11298

COMPARATIVE METABOLISM OF METHOXYCHLOR, METHIOCHLOR, AND DDT IN MOUSE, INSECTS, AND IN A MODEL ECOSYSTEM,
Illinois Univ., Urbana. Dept. of Zoology.
Inder P. Kapoor, Robert L. Metcalf, Robert F. Nystrom, and Gurcharan K. Sangha.
Journal of Agricultural and Food Chemistry, Vol 18, No 6, p 1145-1152, November/December 1970. 2 fig, 6 tab, 31 ref.

Descriptors: *DDT, *Insects, Ecosystems, Fish, Food chains, Solubility, Chromatography, Ultraviolet radiation, Radiochemical analysis, Water pollution effects.
Identifiers: *Metabolites, *Methoxychlor, *Methiochlor, Mice, DDE, DDD, Liver, Biological magnification, Thin-layer chromatography.

Following oral administration of radiolabeled compounds to the mouse 98.3 percent of methoxychlor, 47.11 percent of methiochlor, and 1.02 percent of DDT were eliminated after 25 hr. In both mouse and insects, methoxychlor was metabolized by O-demethylation to form 2- (p-hydroxyphenyl)-2- (p-methoxyphenyl)-1,1,1-trichloroethane and 2,2-bis- (p-hydroxyphenyl)-1,1,1-trichloroethane, which are eliminated largely in conjugated form. In a model ecosystem, methoxychlor was found in fish at the top of the food chain at a level of 1500 times that of the water, as compared to 90,000 times for DDT. The elimination of methoxychlor was in dynamic equilibrium as compared with the storage of DDT, DDE, and DDD. Methiochlor was metabolized in both mouse and insects by oxidation to 2- (p-methylsulfinylphenyl)-2- (p-methylthiophenyl) - 1,1,1 - trichlorethane and by further oxidation to the corresponding bis-sulfoxide and bis-sulfone. In the model ecosystem, methiochlor was found in fish only in traces together with an eight-fold concentration of its polar metabolite 2,2-bis (p-methylsulfinylphenyl)-1,1,1-trichloroetnne. The very pronounced selective insecticidal action of methoxychlor is the result of the much greater efficiency of O-dealkylation in the mammalian liver than in insects. (McCann-Battelle)
W71-11304

GROWTH OF SALMONELLA AT LOW pH,
Wisconsin Univ., Madison. Dept. of Bacteriology.
Keng C. Chung, and J. M. Goepfert.
Journal of Food Science, Vol 35, No 3, p 326-328, May/June 1970. 3 tab, 7 ref.

Descriptors: *Salmonella, *Hydrogen ion concentration, Cultures, Incubation, Acids, Water pollution effects.
Identifiers: Food processing, Acidulants, Inoculum, Soy broth.

The behavior of salmonellae in the presence of several different acids commonly used as acidulants in the food industry was studied. The purpose was to determine the minimum pH value that would permit the initiation of growth by Salmonella in laboratory media. The influence of temperature of incubation, relative oxygen supply, and level of muculum on growth were also studied. A soy broth culture served as the medium of inoculum. Minimum pH values were determined using a medium consisting of 1 percent tryptone, 0.5 percent yeast extract, and 0.1 percent glucose. The growth of salmonellae was observed to occur at pH values as low as 4.05 plus or minus 0.05. The growth limiting pH was dependent on several factors, most important the acid molecule itself. The salmonellae could not be 'trained' to grow at lower pH by sequential transfer at near-optimum pH values. It was emphasized that it is impossible to extrapolate behavior that occurred in laboratory media under ideal conditions to a food product or environmental situation that might exist in a food-processing establishment. (Mortland-Battelle)
W71-11305

TRACE ANALYSIS OF PESTICIDES USING CHOLINESTERASE FROM HUMAN SERUM, RAT LIVER, ELECTRIC EEL, BEAN LEAF BEETLE, AND WHITE FRINGE BEETLE,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W71-11308

ECOLOGY OF THE ALGAE OF A FLORIDA KEY. I. A PRELIMINARY CHECKLIST, ZONATION, AND SEASONALITY,
South Florida Univ., Tampa. University of South Florida, Tampa.
F. C. Croley, and Clinton J. Dawes.
Bulletin of Marine Science, Vol 20, No 1, p 165-185, March 1970. 1 fig, 25 ref.

Descriptors: *Systematics, *Chlorophyta, *Phaeophyta, *Rhodophyta, *Seawater, Florida, Littoral, Samples, Tropic region, Gulf of Mexico, Salinity, Water temperature, Hydrogen ion concentration, Turbidity.
Identifiers: Content Keys (Florida), Sublittoral.

A 2-1/2 year study of the Content Keys, Florida has added 14 species to the list of marine algae known in Florida. Environmental and floristic data are presented in a descriptive account of the zonation, seasonality, and periodicity of the littoral and sublittoral algae. The preliminary checklist comprises 258 taxa: 79 Chlorophyta, 29 Phaeophyta, and 150 Rhodophyta. The sublittoral flora are predominantly perennial. The algae inhibiting the upper sublittoral are largely lithophytes. The majority of the lower sublittoral forms are sand-dwelling siphonous green algae. The measurement of environmental factors included salinity, temperatures, pH, and water transparency. (Mortland-Battelle)
W71-11309

DIVERSE - A FORTRAN IV PROGRAM TO CALCULATE DIVERSITY INDICES OF STREAM BOTTOM ORGANISMS,
Massachusetts Univ. Amherst, Water Resources Research Center.
For primary bibliographic entry see Field 07C.
W71-11313

EFFECT OF IRRIGATION WITH EFFLUENTS FROM THE VOLGA CHEMICAL COMBINE ON THE AGROMELIORATIVE CHARACTERISTICS OF LIGHT CHESTNUT CLAY LOAM SOILS (Vliyaniye oroshcniya stochnymi vodami Volzhskogo khimkombinata na agromeliorativnyye pokazateli tyazheiosuglinistykh svetlo-kashtanoyykh pochy),
L. Ye. Kutepov, and V. T. Dodolina.
Pochvovedeniye, No 7, p 84-93, July 1970. 10 tab, 24 ref.

Descriptors: *Irrigation effects, *Sewage effluents, *Return flow, *Waste water disposal, Land reclamation, Irrigation water, Rates of application, Drainage water, Saline soils, Salts, Salinity, Nitrogen, Potassium, Phosphorus, Crop production, Soil properties.
Identifiers: *USSR, Volga River, Salinization, Mineralization, Solonetzes, Solonetzization.

The problem of using mineralized waste water to irrigate solonetzic Light Chestnut clay loam soils is examined in connection with the hazards of salinization and solonetzization resulting from the composition and degree of mineralization of the water. Light Chestnut clay loam soils became desalinized and desolonetzized after 3 years of irrigation with effluents from the Volga Chemical Combine. These effluents have a mineralization of 11 to 18 meq/liter and a sodium content of 8 to 13 meq/liter. The irrigation rate must be at least 200 mm of water to prevent the top horizons from becoming salinized as a result of the uptake of salts from the nearby salt horizon (80 to 90 cm). A formula employed by the U.S. Department of Agricultural for evaluating the ratio and content of cations in irrigation water is recommended as being most consistent with the law of ion-exchange reactions. Although the content of hydrolyzable nitrogen decreased in Ligh Chestnut clay loam soils after 3 years of irrigation, it remained fairly high. The potassium content increased in most cases during the irrigation period, constituting 39 to 92 mg/100 g of soil. This is considered a very high value for calcareous and chernozemic Solonetzes. The P205 content decreased sharply (from 8.0-10.0 mg to 1.1-1.4 mg/100 g). Irrigation with the total effluents of the Volga Chemical Combine produced crop yields 3-4 times higher than those obtained when irrigation was not used. (Josefson-USGS)
W71-11327

PEACE-ATHABASCA DELTA SYMPOSIUM.
For primary bibliographic entry see Field 04C.
W71-11335

IMPLICATIONS OF POLLUTION TO THE McMURDO SOUND BENTHOS,
Scripps Institution of Oceanography, La Jolla, Calif.; and Washington Univ., Seattle. Dept. of Zoology.
Paul K. Dayton, and Gordon A. Robilliard.
Antarctic Journal of the United States, Vol 6, No 3, p 53-56, May-June 1971. 4 p, 2 fig, 11 ref. NSF Grant GA-1187.

Descriptors: *Water pollution sources, *Water pollution effects, *Antarctic, Heated water, Waste disposal, Landfills, Sedimentation, Waste dumps, Desalination, Sewage, Environmental effects, Benthos.
Identifiers: *McMurdo Sound (Antarctic), *Sounds.

There are three possible sources of marine pollution in McMurdo Sound near McMurdo Station, Antarctica: heated sea water released from the nuclear-powered distilling plant, inorganic trash dumped on sea ice, and organic food wastes and sewage dumped on sea ice that is eventually broken in situ by icebreakers. The sea water temperature within 0.5 m of the elevated outlet for the distilling plant is at the ambient temperature (-1.8C). Nevertheless, in a small area (25-35 sq m) in the vicinity of the outlet, the invertebrates have been killed, possibly as a result of flushing the distilling system. Inorganic litter on the bottom at McMurdo includes fuel lines, barrels, honeybuckets, rope, clothing, tractors, pieces of airplanes, thousands of beer cans, and many other types of trash. The sponges are particularly sensitive to being covered, and even beneath such seemingly insignificant materials as cardboard and clothing all the sponges are dead. Landfill has introduced some siltation. Potentially, the most devasting form of pollution to the benthic community is the large amounts of nutrients introduced in the form of food wastes and accumulated sewage. (Woodard-USGS)
W71-11341

ANALYSIS OF STREAM-TEMPERATURE VARIATIONS IN THE UPPER DELAWARE RIVER BASIN, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02H.
W71-11350

SEDIMENT IN A MICHIGAN TROUT STREAM--ITS SOURCE, MOVEMENT, AND SOME EFFECTS ON FISH HABITAT,
Forest Service (USDA), Cadillac, Mich. North Central Forest Experiment Station.
For primary bibliographic entry see Field 02J.
W71-11351

RELEASE OF METHYL MERCURY FROM SEDIMENTS WITH LAYERS CONTAINING INORGANIC MERCURY AT DIFFERENT DEPTHS,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 05B.
W71-11358

NEW TERTIARY TREATMENT PLANT TO COMBAT EUTROPHICATION,
For primary bibliographic entry see Field 05D.
W71-11383

THE CRITICAL THERMAL MAXIMUM OF JUVENILE SPOT, LEIOSTOMUS XANTHURUS, LACEPEDE,
North Carolina State Univ., Dept. of Zoology.
David Wilder Bridges.
Available from the National Technical Information Service as PB-202 370, $3.00 paper copy, $0.95 in microfiche. Report No. 43, UNC-WRRI, N. C. State University at Raleigh, Publication No. 17, Pamlico Marine Laboratory, N. C. State University at Raleigh January 1971, 39 p, 5 fig, 5 tab, 34 ref, append. OWRR Project B-004-NC (9).

Descriptors: *Thermal pollution, *Water pollution effects, Water quality, *Standards, *Water temperature, *Fish physiology, Cooling water, Heated water, Fishkill, Electric power plants, Temperature, Juvenile fishes, *Juvenile growth stage.
Identifiers: Critical thermal maximum.

The Critical Thermal Maximum (CTM) of juvenile spot was determined throughout their first growing season from the time they entered the oligohaline environment until they left it. Spot were acclimated in the laboratory to combinations of temperature and salinity levels prior to the CTM tests. When the data were analyzed by multiple regression, acclimation temperature, acclimation salinity, weight, weight squared, and length were all found to be significantly important influences on the CTM of juvenile spot. Temperature was the most important influence on CTM with an R sq value of 0.92. Salinity was the least important with an R sq of 0.001, and weight, weight squared and length were all intermediate influences with R sq values of about 0.18. Response surfaces were generated from the prediction equation showing the acclimation temperature necessary to produce a fixed CTM for juvenile spot. These reveal that CTM increases with size (either length or weight) and age during the nursery period. The increase in CTM was somewhat greater between summer and fall sized spot than between spring and summer sized spot. The CTM increased as salinity increased. (Howells-North Carolina)
W71-11409

ENVIRONMENTAL ASPECTS OF MERCURY USAGE.
Dow Chemical Corp., Midland, Mich.

First edition, 3 volumes, August, 1970, unpaged.

Descriptors: Water pollution effects, *Bibliographies, Toxicity, *Pollutant identification, Water pollution sources, *Environmental effects, *Metals, Heavy metals, Industrial wastes, Inorganic compounds, Lethal limit.
Identifiers: *Mercury, Mercury compounds, Methylmercury.

This three-volume index/bibliography, produced under the auspices of the Dow Ecology Council, lists over 2,000 articles on mercury with emphasis on toxicological studies and medical aspects, on methods of analysis, and on observed effects of various organisms including man. Volume I is a keyword index, volume II is a document index, and volume III is an author index.
W71-11417

SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION,
Oregon State Univ., Corvallis. Air Resources Center.
For primary bibliographic entry see Field 06E.
W71-11432

SOME ENVIRONMENTAL IMPLICATIONS OF NATIONAL FUELS POLICIES.
Committee on Public Works (U. S. Senate).

91st Cong, 2d Sess (Comm print 1970). 70 p, 1 fig, 32 tab, 32 ref, 3 append.

Descriptors: *Environmental effects, *Fuels, *Administrative agencies, *Pollution abatement, Water pollution control, Water pollution effects, Water pollution sources, Air pollution effects, Air pollution, Water pollution, Chemical wastes, Oil, Natural gas, Nuclear wastes, Thermal pollution, Administration, Regulation, Expenditures, Costs, Social aspects, Economic impact, Legislation, Legal aspects.

Environmental implications of present national fuels policies are discussed in a report from the Senate Committee on Public Works. Two general matters are considered: (1) effluents released into the environment in the conversion of fuel to energy and (2) the future availability of fuel supplies. Environmental effects studied are primarily air pollution problems. In an appendix, expenditures by various federal agencies on pollution research, development, and demonstration for both air and water pollution are outlined. The expenditures are classified as to various pollution problems, such as effects of pollution on man, air, and water; prevention and control of pollution; and social, economic, and legal aspects of pollution. A compilation and brief description is made of the purposes, functions, and activities of federal agencies having programs that are significantly related to environmental concerns. Federal departments, independent agencies, and selected boards, commissions, and committees are included in the listing. (Smiljanich-Florida)
W71-11433

THERMAL POLLUTION: THE 'DISHONORABLE DISCHARGE'--NEW YORK'S CRITERIA GOVERNING HEATED LIQUIDS,
Jeffrey W. Baker.
Albany Law Review, Vol 34, p 539-563, 1970. 25 p, 100 ref, append.

Descriptors: *New York, *Thermal pollution, *Pollution abatement, *Water pollution control, Water pollution sources, Water pollution effects, Water quality control, Thermal water, Standards, Recreation, Water supply, Fish, Wildlife, Fishkill, Fish reproduction, Fish conservation, Agriculture, Industries, Legislation, Permits, Pollutants, Waste disposal, Heated water, Legal aspects.

In response to increased concern over the effects of thermal water pollution, New York has established criteria governing thermal discharges. The criteria are analyzed, with a discussion of the need for such criteria and their statutory history and basis. The effects of temperature on water use are discussed in the areas of: (1) recreation; (2) public water supplies; (3) wildlife, fish, and other aquatic life; (4) agriculture; and (5) industry. Through continuous application of the thermal pollution criteria, thermal discharges will be allowed to continue so as not to impair maximum usage of water resources. A summary is provided of the arguments advanced by special interest groups in their efforts to obtain greater leniency or strictness. The criteria define a thermal discharge as one which is at a temperature greater than 70 degrees Farenheit. The various specific regulations for established categories of water bodies are outlined. The strictest requirements are for trout streams. The Commissioner of Health may impose additional limitations where demand necessary. Enforcement of the criteria is implemented through the existing permit system of waste disposal. The criteria, if strictly applied, may serve to effectively decrease thermal pollution. (Smiljanich-Florida)
W71-11434

THE BIOLOGY OF THE ESTUARY,
Maryland Univ., Solomons. Chesapeake Biological Lab.
L. Eugene Cronin, and Alice J. Mansueti.
In: A Symposium on the Biological Significance of Estuaries, February 13-14, 1970, Houston, Texas, Sport Fishing Institute, Washington, D.C., March 1971, p 14-39. 33 fig.

Descriptors: *Estuaries, *Ecosystems, *Physiological ecology, *Chemistry, *Biology, *Geology, Human population, Technology, Migration, Balance of nature.

The physical, chemical, geological and biological systems of American estuaries are summarized. Migration, population expansion and technological development are changing these delicate systems. The intent of this summary is to assist logical and effective efforts to live in harmony with the complex and fragile ecosystems of these estuaries. (See also W71-11461 thru W71-11465) (Ensign-PAI)
W71-11460

THE TEXAS WATER PLAN AND ITS EFFECT ON ESTUARIES,
Bureau of Commercial Fisheries, Washington, D.C.
Charles R. Chapman.
In: A Symposium on the Biological Significance of Estuaries, February 13-14, 1970, Houston, Texas, Sport Fishing Institute, Washington, D.C., March 1971, p 40-57. 2 fig, 5 tab, 10 ref.

Descriptors: *Texas, *Water resources development, *Planning, *Estuaries, Reservoirs, Pipelines, Canals, Pumping plants, Municipal water, Industrial use, Irrigation, Mining, Recreation.
Identifiers: *Texas water plan.

The Texas Water Plan is a guide for long-range development of water resources for Texas for all purposes through to the year 2020. It will make the best use of coastal waters, estuaries, reservoirs, canals, pipelines, distribution facilities and pumping stations for municipal and industrial uses, irrigated agriculture, mining, recreation, navigation, control projects and wildlife refuges. The state of Texas has established an interagency Natural Resources Council to develop a comprehensive Coastal Resources Plan to provide for the management and development of the human and natural resources of the urbanizing Texas Gulf Coast Region. Program coordination for the activities of eight state agencies dealing with estuarine problems will be carried out through this Interagency Natural Resources Council. (See also W71-11460) (Ensign-PAI)
W71-11461

THE BIOLOGICAL EFFECTS OF ESTUARIES ON SHELLFISH OF THE MIDDLE ATLANTIC,
New York State Conservation Dept., Ronkonkoma. Div. of Marine Resources.
David H. Wallace.

In: A Symposium on the Biological Significance of Estuaries, February 13-14, 1970, Houston, Texas, Sport Fishing Institute, Washington, D.C., March 1971, p 76-85. 7 fig, 3 tab.

Descriptors: *Estuaries, *Coasts, *Water pollution effects, *Wetlands, Sewage, Chemicals, Shellfish, Oysters, Clams.
Identifiers: New York, New Jersey, Delaware.

The shellfish industry was one of the first marine industries to feel the effects from pollution. The natural habitat of oysters is in estuarine waters which is precisely where our cities are developing. A shift of oyster cultivation away from populated centers has been necessary in New York, New Jersey, Connecticut, Rhode Island and Massachusetts. The oyster industry in the Middle Atlantic has been at a low level of production for 15 years due to pollution and loss of wetlands. Commercial hatcheries are now growing seed which should increase production in the future. Other solutions to estuarine problems through control by legislation are discussed. (See also W71-11460) (Ensign-PAI)
W71-11463

THE EFFECTS OF POLLUTION OF ESTUARIES OF THE NORTHWEST PACIFIC COAST,
Washington Univ., Seattle. Fisheries Research Inst.
Ernest O. Salo, and Quentin J. Stober.
In: A Symposium on the Biological Significance of Estuaries, Sport Fishing Institute, Washington, D.C., March 1971, p 86-95, February 13-14, 1970, Houston, Texas, March 1971, p 86-95. 7 fig, 8 ref.

Descriptors: *Pacific Northwest U.S., *Shores, *Estuaries, *Water pollution effects, *Shellfish, Wastes, Pulp wastes, Industrial wastes, Ships, Domestic wastes, Land development, Watersheds, Washington.
Identifiers: Puget Sound.

Destruction of the small Northwest Pacific estuaries continues. The main causes are municipal and port expansion, real estate developers, individual home owners that demand flood control and protection from wave action. Though the open waters can assimilate considerable destruction and pollution, the coastal areas and estuaries are more vulnerable. Various state environmental commissions and councils, including a Nuclear Siting Evaluation Council have been created and seashore management legislation is being considered to protect these areas. (See also W71-11460) (Ensign-PAI)
W71-11464

THE SIGNIFICANCE OF AN ESTUARY ON THE BIOLOGY OF AQUATIC ORGANISMS OF THE MIDDLE ATLANTIC REGION,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
William H. Massmann.
In: A Symposium on the Biological Significance of Estuaries, February 13-14, 1970, Houston, Texas, Sport Fishing Institute, Washington, D.C., March 1971, p 96-109.

Descriptors: *Atlantic Ocean, *Estuaries, *Aquatic population, *Fish, Birds, Mammals, Dredging, Landfills, Water pollution, Circulation.
Identifiers: Chesapeake Bay.

The Chesapeake Estuary which has most of the characteristics found in all the mid-Atlantic estuaries is described. The water circulation consists of a combination of tidal currents, a seaward flow of low salinity surface water, and an inward flow of high salinity bottom water. A detailed description of the bay as a nursery for fishes is given. Changes in the estuary such as dredging, filling, and the introduction of pollutants all influence these aquatic organisms in various ways. A comprehensive plan, taking into consideration the physical, chemical and biological factors before irreversible changes occur, is being developed for the Chesapeake Bay and other mid-Atlantic estuaries. (See also W71-11460) (Ensign-PAI)
W71-11465

THE STATE OF KNOWLEDGE WITH REGARD TO THE EFFECTS OF PHYSICAL AND CHEMICAL ENVIRONMENTAL CONDITIONS ON MARINE BIOTA WITH EMPHASIS ON THE LONG ISLAND SITUATION.
New York Ocean Science Lab., Montauk. Center for the Environment of Man.

New York Ocean Science Laboratory Technical Report No. 0004, Montauk, N.Y. August 1970. 66 p, 310 ref.

Descriptors: *Water pollution effects, *Biota, *Physical properties, *Chemical properties, *Fishes, *Shellfish, Temperature, Salinity, Dissolved oxygen, Nutrients, Hydrogen ion concentration, Turbidity, Toxins, Pesticides, Heavy metals, Oil, Thermal pollution, New York, Reviews, Bibliographies.
Identifiers: Long Island.

The marine environment that surrounds Long Island was studied for the effects of physical, chemical and environmental conditions, both natural and man imposed, on the biota of the area. Population information such as number, size distribution, age distribution, growth rates of individuals and biomass, and population trends are given for various fish and shellfish. The natural influences of temperature, salinity, dissolved oxygen, nutrients, turbidity, pH, light and barometric pressure along with the toxic influences of pesticides, heavy metals, oil and thermal pollution are presented for each species. (Ensign-PAI)
W71-11466

AERIAL PHOTOGRAPHIC STUDIES OF THE COASTAL WATERS OF NEW YORK AND LONG ISLAND,
New York Ocean Science Lab., Montauk. Center for the Environment of Man.
For primary bibliographic entry see Field 07B.
W71-11467

THE STATE OF KNOWLEDGE WITH REGARD TO THE EFFECTS OF PHYSICAL, CHEMICAL AND BIOLOGICAL CONDITIONS ON THE USES OF COASTAL RESOURCES.
New York Ocean Science Lab., Montauk. Center for the Environment of Man.

New York Ocean Science Laboratory Technical Report No. 0006, December 1970. 26 p, 129 ref.

Descriptors: *Physical properties, *Chemical properties, *Environmental effects, *Fishes, *Shellfish, Temperature, Salinity, Hydrogen ion concentration, Dissolved oxygen, Turbidity, Coliforms, Color, Nutrients, Toxins, Reviews, Bibliographies.

The effects of temperature, salinity, pH, dissolved oxygen, turbidity, color, coliforms, nutrients and toxins on finfish and shellfish of coastal areas were studied. Biological and physical effects such as population characteristics, water depth, currents, waves, and topography were also investigated for their effects on the uses of coastal resources. (Ensign-PAI)
W71-11468

THE ECOLOGY OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11476

WATERS AND WATERCOURSES--POLLUTION AS A PERMANENT INJURY--PROXIMATE CAUSE (OKLAHOMA 1930).
For primary bibliographic entry see Field 06E.
W71-11484

IMPROVEMENT AND APPLICATION OF BENTHIC ALGAL ISOTOPE PRODUCTIVITY MEASURING METHODS,
Hawaii Univ., Honolulu. Dept. of Botany.
For primary bibliographic entry see Field 05A.
W71-11486

BENTHIC INFAUNA COMMUNITIES OFF THE COAST OF WASHINGTON AND IN PUGET SOUND: SPECIES COMPOSITION AND STRUCTURE OF THE OFFSHORE COMMUNITIES,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05A.
W71-11487

SENSITIVITY OF BENTHIC MICROFLORA TO POLLUTION GRADIENTS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 05A.
W71-11490

A STUDY OF PHYTOPLANKTON IN THE LESSER ANTILLES REGION,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 05A.
W71-11493

AIRBORNE AMMONIA EUTROPHIES LAKES.
For primary bibliographic entry see Field 05B.
W71-11496

PESTICIDES IN WATER: COPPER SULFATE IN FLOODED CRANBERRY BOGS,
Massachusetts Univ., East Wareham. Cranberry Experiment Station.
For primary bibliographic entry see Field 05A.
W71-11498

TOXICITY OF HEPTACHLOR TO AQUATIC LIFE,
Kalyani Univ. (India). Dept. of Zoology.
S. K. Konar.
Journal Water Pollution Control Federation (Research Supple.), Vol 42, No 8, Part 2, p R299-R303, August 1970. 3 tab, 8 ref.

Descriptors: *Heptachlor, *Toxicity, *Bioassay, Daphnia, Carp, Aquatic insects, Salmon, Rainbow trout.
Identifiers: *Safe application rates, Ceriodaphnia, Cyclops, Diaptomus, Nauplius, Cypris, Gastrotrica, Brachionus, Volvox, Pandorina, Singhi, Punti, Nandus, Flying barbel, Khalisa, Koi, Tengra, Cuchia, Murrel.

Bioassays were conducted using 10 fish species, 9 insect species and 11 plankton organisms to determine the toxicity of heptachlor to aquatic life. The results, which are presented in tabular form, indicate that heptachlor is highly persistent and lethal to fish, aquatic insects, and plankton under laboratory conditions and that it deteriorates slowly. Safe application rates of heptachlor when applied intermittently to 3-foot deep water are given. (Mortland-Battelle)
W71-11502

DEGRADATION OF CARBOXIN (VITAVAX) IN WATER AND SOIL,
Uniroyal Inc., Naugatuck, Conn. Uniroyal Chemical Div.
Wei-Tsung Chin, Gracie M. Stone, and Allen E. Smith.
Journal of Agricultural and Food Chemistry, Vol 18, No 4, p 731-732, July-August 1970. 1 fig, 3 tab, 9 ref.

Descriptors: *Fungicides, *Chromatography, *Chemical degradation, Oxidation, Water pollution effects, Hydrolysis.

Identifiers: *Carboxin, *Thin-layer chromatography.

The degradation of the fungicide carboxin in water and soil was studied using thin-layer chromatography. In water, the main change was oxidation to its sulfoxide. The oxidation rate was retarded by higher pH. Hydrolysis was not detected under any conditions. In soil, carboxin activity decreased rapidly due to its quick oxidation to the less active sulfoxide. Again, hydrolysis was not detected. In a separate experiment, the sterilized soil was extracted 7 days after fortification and standing at room temperature. It was found that about 20 percent of carboxin was oxidized to the sulfoxide. This would indicate that microbial activity is not an essential factor for this conversion. This conjecture is supported by the fact that oxidation of carboxin to sulfoxide was observed in dilute sollutions in several organic solvents. (Mortland-Battelle)
W71-11504

A VISUAL DEMONSTRATION OF THE BENEFICIAL EFFECTS OF SEWAGE TREATMENT FOR PHOSPHATE REMOVAL ON PARTICULATE MATTER PRODUCTION IN WATERS OF LAKES ERIE AND ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.; and Ontario Water Resources Commission, Toronto.
J. R. Vallentyne, W. E. Johnson, and A. J. Harris.
Journal of the Fisheries Research Board of Canada, Vol 27, No 8, p 1493-1496, August 1970. 1 fig, 1 tab, 5 ref.

Descriptors: *Sewage treatment, *Phosphates, *Eutrophication, *Water pollution control, Sewage effluents, Aquatic algae, Lake Erie, Lake Ontario, Nutrients, Nitrogen, Filtration, Microscopy, Industrial wastes, Detergents, Ammonia, Nitrites, Nitrates.
Identifiers: Orthophosphates.

A program to control euthrophication in Lakes Erie and Ontario by decreasing the supply of phosphorus compounds has been developed. This study was conducted to determine the effect of removing phosphate from sewage on algal growth. Filtered samples of raw sewage, biologically treated sewage, and sewage treated chemically for phosphate removal were added to unfiltered waters from Lakes Erie and Ontario, and particulate residues (PR) on Millipore filters photographed after incubation in light for 10 and 30 days. PR levels in the sewage-enriched flasks were least in the case of sewage treated for removal of phosphates. Addition of phosphate to the phosphate-depleted effluent increased its PR generating ability to that of raw and biologically treated sewage. The removal of phosphates from sewage wastes thus appears to eliminate their fertilizing effect. (Mortland-Battelle)
W71-11507

SIGNIFICANCE OF THE FOOD CHAIN IN DDT ACCUMULATION BY FISH,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 05B.
W71-11508

YELLOW PHOSPHORUS POLLUTION: ITS TOXICITY TO SEAWATER-MAINTAINED BROOK TROUT (SALVELINUS FONTINALIS) AND SMELT (OSMERUS MORDAX),
Fisheries Research Board of Canada, Halifax (Nova Scotia). Halifax Lab.
G. L. Fletcher, R. J. Hoyle, and D. A. Horne.
Journal of the Fisheries Research Board of Canada, Vol 27, No 8, p 1379-1384, August 1970. 4 fig, 9 ref.

Descriptors: *Phosphorus, *Toxicity, *Brook trout, *Smelts, *Fishkill, Industrial wastes, Herring, Eels, Bioassay, Fish physiology.
Identifiers: Placentia Bay (Newfoundland), Cod, Flounder, Turbot, Newfoundland.

After a large fishkill in the area of Placentia Bay, Newfoundland occurred coincidentally with the opening of a phosphorus-producing plant in Long Harbour, an investigation was undertaken to evaluate the toxicity of elemental phosphorus to seawater-maintained brook trout and smelt. The investigation showed that yellow phosphorus was lethal to the trout at concentrations as low as 0.5 mg/liter. Trout that were exposed to low concentrations of yellow phosphorus (0.5 and 7.0 mg/liter) for 50 or more hours turned red around the head and fins and showed signs of extensive hemolysis. At death, all trout that had been exposed to yellow phosphorus concentrations of 104 mg/liter or less were significantly lower in hematocrits than were the controls. Preliminary data indicated that phosphorus is equally lethal to smelt. (McCann-Battelle)
W71-11509

CLEAN LAKES ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, AND FOR OTHER PURPOSES).
For primary bibliographic entry see Field 06E.
W71-11511

NUTRIENT SUPPLY AND PRIMARY PRODUCTION IN CLEAR LAKE, EASTERN ONTARIO,
Trent Univ., Peterborough (Ontario).
D. W. Schindler, and J. E. Nighswander.
Journal of the Fisheries Research Board of Canada, Vol 27, No 11, p 2009-2036, 1970. 16 fig, 11 tab, 57 ref.

Descriptors: *Nutrient, *Phytoplankton, *Precipitation (Atmospheric), *Primary productivity, Zooplankton, Oxygen, Temperature, Nitrogen, Phosphorus, Calcium, Filtration, Magnesium, Sodium, Potassium, Silica, Cyanophyta, Chlorophyta, Chrysophyta, Pyrrophyta, Carbon, Runoff, Evaporation, Evapotranspiration, Diatoms, Standing crop, Ammonia, Nitrates, Phosphates, Regression analysis.
Identifiers: Clear Lake (Canada), Aphanothece clathrata, Chroococcus limneticus, Gloeothece linearis, Merismopedia tenuissima, Rhabdoderma lineare, Ankistrodesmus falcatus var acicularis, Crucigenia rectangularis, Gloeococcus schroeteri, Oocystis lacustris, O submarina var variabilis, Pleodorina californica, Staurodesmus triangularis, Volvox tertius, Dinobryon bavaricum, D cylindricum Imhof var palustre,D divergens, Mallomonas caudata, Synura uvella, Botryococcus braunii, Botryococcus protuberans, Cyclotella comta, Melosira italica, Stephanodiscus astraea, Asterionella formosa, Fragilaria crotonensis, Fragilaria pinnata, Navicula pupula, Synedra ulna, Cryptomonas marssonii, Cryptomonas ovata, Ceratium hirundinella, Peridinium cinctum, Peridinium inconspicuum, Peridinium willei, Peridinium wisconsiense.

Clear Lake, a small Canadian Shield lake that has been influenced little by human activity, was found to be more productive than expected from chemical and optical properties and geological surroundings. Production during the ice-free season ranged from 0.10 to 2.57 g C/m sq per day and averaged 250 g C/m sq per year for the lake as a whole. Other limnological factors studied (phytoplankton standing crop, oxygen, temperature, and nutrient regimes) were typical for an oligotrophic lake. The high production values are partially explained by the high correction for filtration error, which averaged 3.2 times for all occasions tested. Atmospheric precipitation is undoubtedly the major source of supply of the nutrients nitrogen and phosphorus to Clear Lake. Calcium and magnesium also appear to be largely carried in by precipitation, although most of the sodium, potassium, and silica entering the lake is weathered from the terrestrial watershed. (McCann-Battelle)
W71-11512

DETERGENT POLLUTION CONTROL ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO ESTABLISH STANDARDS AND PROGRAMS TO ABATE AND CONTROL WATER POLLUTION BY SYNTHETIC DETERGENTS).
For primary bibliographic entry see Field 06E.
W71-11516

BIOLOGICAL ASPECTS OF THERMAL POLLUTION. I: ENTRAINMENT AND DISCHARGE CANAL EFFECTS,
Oak Ridge National Lab., Tenn. Ecological Sciences Div.; and Minnesota Univ., Minneapolis. Dept. of Ecology and Behavioral Biology.
Charles C. Coutant, and Alan J. Brook.
Critical Reviews in Environmental Control, Vol 1, No 3, p 341-381, November 1970. 16 fig, 2 tab, 140 ref.

Descriptors: *Thermal pollution, *Biological communities, *Thermal power plants, *Discharge (Water), Aquatic habitats, Environmental effects, Heated water, Nuclear power plants, Steam, Ecology, Phytoplankton, Zooplankton, Larvae, Eggs, Chinook salmon, Striped bass, Minnows, Fishkill, Herring, Copepods, Crustaceans, Diatoms, Cyanophyta, Photosynthesis, Oysters, Clams, Trout, Mussels, Mathematical models, Dissolved oxygen, Cooling towers, Lake Michigan, Condensers, Diptera, Predation, Algae, Nitrogen fixation, Food chains, Eutrophication, Catfishes, Bullheads, Carp, Perches, Metabolism, Oxygen requirements, Respiration, Suckers, Sexual maturity, Spawning, Resistance, Aquatic productivity, Canals.
Identifiers: *Entrainment, White River (Indiana), Connecticut River (Connecticut), Green River (Kentucky), Cayuga Lake (New York), Patuxent Estuary, Biscayne Bay (Florida), Humbolt Bay (California), Potomac River, Columbia River (Washington), Cockles, Goldfish, Merrimack River (New Hampshire), Delaware River, Illinois River, Holston River (Tennessee).

This review attempts to critically evaluate some thermal effects seen at operating thermal power plants, to group these into several 'problems' associated with (1) entrainment and (2) discharge canals, and to indicate pertinent field and laboratory experiments that can assist in developing information of predictive utility. Most power plant surveys lack detail of observation and definition of goals sufficient to provide more than circumstantial evidence for ecological processes. On the other hand, laboratory experiments are often unrealistic simulations of complex phenomena. True predictability will require judicious application of data from both sources. Until complete information is available, certain laboratory tests provide conservative approximations that can guide power plant siting and design so that safe environments can be maintained for aquatic life. (McCann-Battelle)
W71-11517

THE ROLE OF CARBON IN EUTROPHICATION,
Missouri Univ., Columbia. Dept. of Civil Engineering.
Darrell L. King.
Journal Water Pollution Control Federation, Vol 42, No 12, p 2035-2051, December 1970. 8 fig, 65 ref.

Descriptors: *Eutrophication, *Carbon, *Photosynthesis, *Algae, Carbon dioxide, Alkalinity, Nutrients, Ammonia, Hydrogen ion concentration, Cyanophyta, Chlorella, Chlorophyta, Scenedesmus, Euglena, Dissolved oxygen, Diurnal distribution, Aquatic productivity, Nitrogen, Phosphorus, Lakes.
Identifiers: Phormidium, Chlorella pyrenoidosa, Chlamydomonas, Fontinalis, Astinastrum, Anacystis nidulans, Microcystis.

This literature review surveys the role of carbon in lake eutrophication. The importance of carbonate alkalinity and the role of carbon dioxide in photosynthesis are discussed in detail. It is concluded that although nitrogen, phosphorus, and a

variety of other nutrients are required by algae, eutrophication seems to be ultimately a carbon-accumulation phenomenon. Initial algal response to additions of nitrogen and phosphorus to an oligotrophic lake indicates that one of these basic nutrients is the factor limiting photosynthesis in that lake. However, in a lake with low alkalinity, biological indicators of eutrophication, such as midsummer blue-green algal blooms, often are noted following only slight additions of nitrogen and phosphorus. The amount of nitrogen, phosphorus, and other plant nutrients required to produce midsummer blue-green algal dominance in any lake seems to be related directly to the bicarbonate-carbonate alkalinity of that lake. Any attempt to maximize algal productivity while maintaining algal species suitable for human or animal food will require control of carbon dioxide availability in addition to the supply of sufficient quantities of other plant nutrients to allow unhindered algal photosynthesis. (Mortland-Battelle)
W71-11519

STUDIES OF THE BIODEGRADATION OF PARATHION,
Massachusetts Univ., East Wareham. Lab. of Experimental Biology; and Massachusetts Univ., Amherst. Inst. of Agricultural and Industrial Microbiology.
B. M. Zuckerman, K. Deubert, M. Mackiewicz, and H. Gunner.
Plant and Soil, Vol 33, No 2, p 273-281, October 1970. 4 tab, 11 ref.

Descriptors: *Pesticides, *Organophosphorus compounds, *Biodegradation, Soil contamination, Chlorella, Bioassay, Gas chromatography, Cultures, Metabolism, Toxicity.
Identifiers: *Parathion, Liquid scintillation, Radiological techniques, Metabolites, Vinegar flies.

Earlier work has shown that microorganisms in the soil breakdown organophosphorus pesticides by metabolizing parathion to aminoparathion, p-nitrolphenol, and p-aminophenol. Such breakdown could result in a variety of metabolites, some dangerous to man. In the present study, parathion degradation by Chlorella pyrenoidosa proteose was studied by radiological and gas chromatographic techniques. Four compounds formed as the results of parathion degradation were identified or partly characterized. The major parathion metabolite, aminoparathion, was shown by bioassay to be nontoxic to vinegar flies at the levels tested. Evidence is presented that aminoparathion is released rapidly from algal cells after this compound is formed from parathion. Metabolites of unknown chemical structure which were detected were partially characterized as follows: Metabolite 1 - contains sulfur and phenyl ring, strong cholinesterase inhibitor; Metabolite 2 - contains sulfur, lacks phenyl ring, not a cholinesterase inhibitor at levels tested. Metabolite 3 - contains phenyl ring but not sulfur, a strong cholinesterase inhibitor. Probably an oxon of parathion. The findings herein support previous conclusions that biotic forces, rather than abiotic factors, are of greater importance to the degradation of parathion under natural conditions extant in a temperate climate. (Mortland-Battelle)
W71-11521

LONG-TERM CHANGES IN THE LIMNOLOGY AND MACROZOOPLANKTON OF A LARGE BRITISH COLUMBIA LAKE,
British Columbia Dept. of Recreation and Conservation, Victoria. Fish and Wildlife Branch.
E. R. Zyblut.
Journal of the Fisheries Research Board of Canada, Vol 27, No 7, p 1239-1250, July 1970. 4 fig, 2 tab, 29 ref.

Descriptors: *Eutrophication, *Zooplankton, *Nutrients, *Water properties, Light penetration, Hydrogen-ion concentration, Electrical conductance, Phosphates, Aquatic productivity, Crustaceans, Distribution patterns, Phosphorus, Water temperature, Daphnia, Copepod, Nets.
Identifiers: Kootenay Lake (Canada), Bosmina, Diaphanosoma, Nauplii, Diaptomus, Cyclops, Mysid.

Macrozooplankton distribution and abundance as well as limnological conditions were compared during 1949 and 1964 in Kootenay Lake, a large oligotrophic lake in southeastern British Columbia. The standing crop of macrozooplankton increased two- to three-fold over 15 years. Changes in physical-chemical limnological conditions, such as a decrease in depth of light penetration, and increases in pH, specific conductivity, dissolved nutrients, and phosphates also occurred, indicating an increase in productivity. The most noticeable change in macrozooplankton was a shift in cladoceran species composition in the north arm of the lake, formerly dominated by Daphnia but now by Diaphanosoma. Size-selective predation, differences in food availability, and completion for food with Diaphanosoma and Mysis relicta are suggested to be responsible for changes in the spatial distribution of Daphnia since 1949. Examination of changes in midsummer zooplankton abundance between successive years (1964-66) indicated that total zooplankton was least abundant in 1964. Differences in abundance during this period were small when compared with those between 1949 and 1964. (Mortland-Battelle)
W71-11523

SEASONAL CHANGES IN THE ZOOPLANKTON OF SOUTH BISCAYNE BAY AND SOME PROBLEMS OF ASSESSING THE EFFECTS ON THE ZOOPLANKTON OF NATURAL AND ARTIFICIAL THERMAL AND OTHER FLUCTUATIONS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
M. R. Reeve.
Bulletin of Marine Science, Vol 20, No 4, p 894-921, December 1970. 8 fig, 1 tab, 18 ref.

Descriptors: *Thermal pollution, *Salinity, *Copepods, Zooplankton, Florida, Electric powerplants, Dissolved oxygen seasonal, Biomass, Sampling, Water temperature, Annelids.
Identifiers: *Biscayne Bay (Florida), Acartia tonsa, Paracalanus parvus, Temora turbinata, Labidocera scotti, Oithona nana, Metis jousseaumei, Holoplankton, Copepod nauplii, Calanopia americana, Sagitta hispida, Polychaetes, Data interpretation, Decapods.

The seasonal variation in zooplankton from five stations in south Biscayne Bay (Miami) over one year is presented, and the data are condensed into two groups, inshore and midbay. The inshore stations were characterized by generally lower and more variable salinity and higher temperature compared to the midbay. The quantitatively important copepods were confined to six genera, which were each dominated by single species. The seasonal fluctuations in number at both locations are given for each, as well as abundance in relation to temperature-salinity plots. Since numbers provided a poor basis for comparison of their relative contributions to biomass, dry-weight estimates were obtained which emphasized that the numerically dominant but diminutive Oithona had a biomass in the same order of magnitude as the numerically unimportant but many times larger Labidocera. Both the mean naupliar count and copepod dry weights were similar over the year inshore and in the midbay. The major meroplanktonic components were decapod larvae, molluscan veligar larvae, and larvae of polychaetous annelids. All were more abundant inshore, partly due to the concentrating effect of the shallower water column. Problems of sampling, such as type of gear, frequency, and patchiness are noted, as well as the limitations of this type of sampling study as a monitor of the effects of thermal effluents. (Mortland-Battelle)
W71-11526

SPATIAL HOMOGENEITY: STATISTICAL ANALYSES OF UNISPECIES AND MULTISPECIES POPULATIONS OF FORAMINIFERA,
Smithsonian Institution, Washington, D.C. Div. of Invertebrate Paleontology.
Martin A. Buzas.
Ecology, Vol 51, No 6, p 874-879, Late Summer 1970. 1 fig, 5 tab, 18 ref.

Descriptors: *Protozoa, *Distribution patterns, *Statistical method, Delaware, Cores, Sampling.
Identifiers: Foraminifera, *Rehoboth Bay (Delaware), Analysis of variance, Data interpretation, Ammonia beccarii, Elphidium clavatum, Elphidium tisburyensis, Elphidium sp.

In Rehoboth Bay, Delaware, 16 stations, each 10 m apart in a 4-by-4 grid, were sampled with 5 replicates. The living individuals of four species of Foraminifera were enumerated. Analyses of variance of unispecies populations indicate that only one relatively rare species has homogeneous densities. Analyses of differences between stations by the S-method indicate that one of the three species with inhomogeneous densities has a high or patch at one station. Although two other species have inhomogeneous densities, none of the contrasts indicate any patches within the study area. Multivariate analysis of variance of the multispecies population indicates that the mean vectors of densities are inhomogeneous. Canonical variate analysis shows that this inhomogeneity is due to high species densities at one station. Efficient utilization of habitat space by unispecies populations probably accounts for the homogeneity of the multispecies population at the remaining 15 stations. (Mortland-Battelle)
W71-11528

CALCIUM AND STRONTIUM DISCRIMINATION BY AQUATIC PLANTS,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
I. L. Ophel, and C. D. Fraser.
Ecology, Vol 51, No 2, p 324-327, Early Spring 1970. 1 fig, 1 tab, 15 ref.

Descriptors: *Calcium, *Food chains, *Spectrophotometry, *Pollutant identification, Ontario, Algae, Mosses, Aquatic plants.
Identifiers: *Strontium, *Sample preservation, *Flame emission spectrophotometry, Perch Lake (Ontario), Ashing, Biological magnification.

Aquatic plants were collected over a 3-year period from Perch Lake, Ontario. The plants were taken to the laboratory in plastic bags, washed, dried to a constant weight at 110 C, and ashed in porcelain crucibles. Calcium and strontium were analyzed using a flame emission spectrophotometer. Sr/Ca ratios are given for 22 species of algae, moss, and vascular plants. When compared with the lake water, 16 species were found to discriminate against calcium relative to strontium. These species introduce a strontium enrichment step into any food chain in which they participate. One species (Nymphaea odorata) showed a remarkable discrimination against strontium. (Mortland-Battelle)
W71-11529

COMPETITION FOR NUTRIENTS BY MARINE PHYTOPLANKTON IN OCEANIC, COASTAL, AND ESTUARINE REGIONS,
Woods Hole Oceanographic Institution, Mass.
Edward M. Hulburt.
Ecology, Vol 51, No 3, p 475-484, Late Spring 1970. 6 fig, 3 tab, 23 ref.

Descriptors: *Phytoplankton, *Nutrients, *Distribution patterns, Estuaries, Seawater, New York, Massachusetts, Centrifugation, Sedimentation, Diatoms, Chlorella, Mathematical studies.
Identifiers: Great South Bay (New York), Moriches Bay (New York), Woods Hole (Massachusetts), Chlorophycean sp., Coceolithus huxleyi C, Discosphaera tubifera C, Cydococcolithus leptoporus C, Gymnodinium punctatum,

Syracosphaera pulchra C, Katodinium rotundatum, Umbellosphaera irregularis C, Rhizosolenia delicatula D, Syracosphaera mediterranea C, Oxytoxum variabile, Trichodesmium thiebautii, Calyptrosphaera oblonga C, Oxytoxum sp.

In the open and coastal ocean one or several marine phytoplankton species may increase sharply in abundance without causing a reduction in abundance of other forms. Theoretical calculations of the maximum size of nutrient-depleted zones about the plankton cells show that overlapping of these zones cannot occur at cell densities less than 3 x 10 to the 8th power/liter. Since densities rarely exceed 10 to the 6th power/liter in the open and coastal ocean, there is no possibility of an abundant species monopolizing the nutrient supply and forcing a less abundant form to extinction. The change from a coccolithophore-dominated plankton in the Sargasso Sea to the diatom-dominated plankton in the coastal water off New York cannot, therefore, be attributed to competition for nutrients by the two types of cells. But in some very shallow estuaries the dominant forms sink considerably more slowly than the coastal and oceanic species and would thus be at an advantage over the latter. Plankton concentrations in the estuaries may come close to or exceed 10 to the 9th power/liter, and onopolization of the nutrient supply should aid in the continued dominance of the abundant forms. This sequence is considered to be the reason for the reduced diversity of species observed there. (Mortland-Battelle)
W71-11531

TOXIC CHEMICALS--THE RISK TO FISH,
Huntingdon Research Centre (England).
Lionel E. Mawdesley-Thomas.
New Scientist, Vol 49, No 734, p 74-75, January 14, 1971.

Descriptors: *Toxicity, *Pesticides, *Fish, Aldrin, DDT, Dieldrin, Endrin, 2-4-D, Heptachlor, Phenolic pesticides, Sulfur, Aminotriazole, Dalapon, Water pollution effects, Rainbow trout, Channel catfish, Sunfish, Salmon.
Identifiers: Manazon, Dimethoate, Endothal, Lead arsenate, Linuron, MCPA, Propham, Pyrazon, Simazine, Carbaryl, Demeton methyl, Desmetryne, Disulfoton, DNOC, Mancozeb, Phenkapton, Phosphamidon, Captan, Copper salts, Dinoseb, Dodine acetate, Malathion, Maneb, 2,4,5-T, Azinphos methyl, Dinocap, Lindane (gamma-BHC), Phorate, TDE, Mecarbam, Endosulfan, Goldfish, Harlequin.

Tests recommended by both U.S. and British authorities for determining the toxicity to fish of pesticides are reviewed and their inadequacies discussed. Suggestions are made for long-term studies that would provide more viable information. The approximate toxicities of pesticides most commonly used in Britain are presented. (Mortland-Battelle)
W71-11534

THERMAL POLLUTION OF COLUMBIA RIVER MIGHT THREATEN SMELT,
National Marine Fisheries Service, Seattle, Wash. Biological Lab.
George R. Synder.
Commercial Fisheries Review, Vol. 32, No. 12, p 58-64, Dec 1970. 8 fig.

Descriptors: *Columbia River, *Thermal pollution, *Smelts, *Nuclear powerplants, Salmon, Trout, Washington, Eggs, Commercial fishing, Sport fishing, Aquatic productivity, Water temperature, Water pollution effects.
Identifiers: Shad, Sturgeon, Cowlitz River (Washington), Kalama River (Washington), Lewis River (Washington).

The National Marine Fisheries Service initiated an investigation to determine what effect temperature increases would have on aquatic animals and plants between Kalama and Longview, Washington. NMFS is cooperating closely with State and Federal agencies to investigate effects of thermal pollution on anadromous fish such as salmon, trout, sturgeon, shad, and smelt in the Columbia River. During winter 1968, adult smelt were examined to determine their thermal tolerance. Fish exposed 1 hour to 16 F suffered 50 percent mortality after a 32-hour holding period. Most females placed in water heated 7 F above river temperature failed to deposit eggs. Tests were conducted during 1969 to verify preliminary observations that adult smelt are intolerant to temperature increases. The general results of temperature tolerance studies verified earlier results. Smelt populations could face serious problems if thermal nuclear plants are allowed to discharge heated water into river. The problems could be compounded if water-temperature regulations and standards for the Columbia are based on tolerance limits of steelhead trout and salmon, the most valuable anadromous fish. (McCann-Battelle)
W71-11543

LAKE ERIE PHYSICAL LIMNOLOGY CRUISE, MIDSUMMER 1967,
Ohio Dept. of Natural Resources, Columbus. Div. of Geological Survey.
Charles E. Herdendorf.
Ohio Geological Survey Report of Investigations No. 79, 1970. 77 p. 33 fig, 13 tab, 8 ref.

Descriptors: *Lake Erie, *Limnology, Ohio, Bottom sediments, Hydrogen-ion concentration, Dissolved oxygen, Electrical conductance, Color, Chlorides, Turbidity, Water temperature, Currents (Water), Waves (Water), Water levels, Meteorological data, Sampling, Ions, Water quality, Winds, Sediments.
Identifiers: Lake St. Clair (Michigan), Detroit River (Michigan), Niagara River (New York).

In July and August 1967 a cruise was undertaken to provide new information on the physical limnology of Lake Erie, with particular attention to circulation patterns and to changes that occur in the quality of the water as it passes through the lake. The objective of the field survey was to measure several physicochemical properties of Lake Erie water from its major inflow at the Detroit River to outflow in the Niagara River. This was done by making thirteen transects across Lake Erie and its connecting waterways. Observations of water properties and movements were made at 110 stations, and in most cases consisted of profile measurements with readings and samples taken at various depths from surface to bottom from aboard the Ohio Division of Geological Survey research vessel, GS-1. The properties and conditions investigated on the cruise were (1) water temperature, (2) specific conductance, (3) water color, (4) transparency, (5) hydrogen-ion concentration (pH), (6) dissolved-oxygen content, (7) chloride-ion concentration, (8) turbidity, (9) currents, (10) waves, (11) water levels, (12) meteorological conditions, (13) water depth, and (14) bottom deposits. (Mortland-Battelle)
W71-11551

BACTERIAL POPULATION OF HUMIFIED LAKES,
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
A. G. Rodina.
Microbiology (USSR) Vol. 38, No. 3, p 446-451, May-June 1969. 2 fig, 6 tab, 17 ref.

Descriptors: *Humus, *Aquatic bacteria, *Yeasts, *Plankton, *Water properties, Cations, Turbidity, Water temperature, Hydrogen-ion concentration, Carbon dioxide, Oxygen demand, Nitrogen, Actinomycetes, Lakes, Benthos, Detritus, Azotobacter, Sulfur bacteria, Pseudomonas, Isolation.
Identifiers: *Humification, Bichromate, Permanganate, Soviet Union, Lake Naryadnoe (USSR), Lake Solov'evskoe (USSR), Caulobacter vibrioides, Rhodomicrobium vanielli, Beggiatoa alba, Beggiatoa arachnoidea, Beggiatoa leptomitiformis, Beggiatoa minima, Thiothrix torquis, Thiopedia rosea, Chromatium wessei, Chromatium minus, Rhabdochromatium fusiforme, Rhabdochromatium linsbaueri, Thiothrix undulata, Thiothrix nivea, Thiopedia elongata.

The number of bacterial plankton in humified lakes of different degrees of humification varies within wide limits: it is lower than in eutrophic lakes but appreciably higher than in oligotrophic lakes. The bacterial population of humified lakes consists of various physiological groups. Nonsporeforming rods predominate; the ratio of rods to cocci is quite close in all lakes. The composition of the cenoses of humified lakes consists of many yeasts, filamentous forms, and azotobacter-like cells in the bottom layers of water and in the surface layers of water. The presence of actinomycetes was noted in Lake Naryadnoe and heterotrophic iron bacteria in Lake Solov'evskoe. (Mortland-Battelle)
W71-11555

SURVIVAL OF GREEN ALGAE IN RELATION TO CONDITIONS AND DURATION OF STORAGE,
Moscow State Univ. (USSR). Dept. of Microbiology.
M. N. Pimenova, I. V. Maksimova, and E. N. Zhdannikova.
Microbiology (USSR) Vol. 38, No. 3, p 452-457, May-June 1969. 5 tab, 17 ref.

Descriptors: *Chlorella, *Scenedemus, *Storage, Cultures.
Identifiers: *Ankistrodesmus falcatus, U.S.S.R., Sample preservation, Chlorella pyrenoidosa, Chlorella vulgaris, Chlorella sp.

This investigation assessed the value of different conditions of storage of cultures of algae from the point of view of their ability to survive. The results demonstrated once again the undesirability of storing thermophilic variants of Chlorella (the first four stains) in a refrigerator. After storage for 1 year two strains of Chlorella (C. pyrenoidosa S-39 and C. vulgaris v-t) lost their viability completely, in all three alternative forms of the experiment. When two other strains of Chlorella - Chlorella sp. T-1 and Chlorella sp. (from Pratt) - were stored for 12 months, a high mortality was observed among the algal cells on slopes covered with mineral oil and, in particular, on slopes under cotton-wool plugs. However, the same cultures kept well in ampules, as shown by the high percentage of living cells (43.2 percent). Of the mesophilic forms, the culture of A. falcatus did not deep so well as the rest. The remaining mesophilic strains kept their viability well in ampules. These results indicate that the investigated strains of algae can be transferred to fresh medium once per annum and then stored on agar in ampules sealed in an atmosphere of air. Mesophilic strains of algae must be kept in a refrigerator when treated in this way, but thermophilic strains must be stored at room temperature. An exception to this rule is A. falcatus, which must be transferred at least once every 6 months. (McCann-Battelle)
W71-11556

PROLONGED STORAGE OF COLLECTION STRAINS OF SOME SPECIES OF ALGAE,
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
N. S. Odoevskaya, L. M. Gerasimenko, and S. V. Goryunova.
Microbiology (USSR) Vol. 38, No. 3, p 458-460, May-June 1969. 2 tab, 8 ref.

Descriptors: *Chlorella, *Storage, *Scenedesmus, Culture.
Identifiers: U.S.S.R., Sample preservation, Chlorella ellipsoida, Chlorella pyrenoidosa, Chlorella vulgaris, Pediastrum boryanum, Scenedesmus acutus, Scenedesmus acuminatus, Hormidium, Stichococcus bacilarus, Mesataenium caldariorum.

Thirty-five strains of algae were investigated for storage for long periods of time. The cultures were stored in a refrigerator for three and six years. The difference between cultures stored for three and six years was very significant. Individual strains of different species of Chlorella and Scenedesmus after storage for six years, completely or largely lost their original growth activity under intensive cultivation conditions. Cultures stored for three years preserved their activity much better than when kept at room temperature. Many species of algae, particularly green algae, can be kept for long periods without transfer to fresh medium in darkness and at low temperatures (5-8 C). The limiting period of storage under these conditions has not been accurately determined because of the difficulty in maintaining the moisture content of the agar required by the cultures. (McCann-Battelle)
W71-11557

ISOLATION METHODS AND SOME BIOLOGICAL FEATURES OF MICROORGANISMS OXIDIZING GASEOUS HYDROCARBONS,
Akademiya Nauk URSR, Kiev. Inst. of Microbiology and Virology.
E. I. Kvasnikov, Yu. R. Malashenko, and V. A. Romanovskaya.
Microbiology (USSR) Vol. 38, No. 6, 828-833, November-December 1969. 2 fig, 4 tab, 14 ref.

Descriptors: *Oil wastes, *Pseudomonas, *Cultures, Natural gas, Swamps, Soil analysis, Nutrients, Carbon, Ammonia, Toxicity, Oxidation, Nitrogen, Isolation, Oil.
Identifiers: *Hydrocarbons, Soviet Union, Mycobacterium, Psuedomonas methanica, Methanomonas methanoxidans sp., Mycobacterium flavum methanicum, Mycobacterium mucosum.

From oils of swamps and gas deposits, a number of bacterial cultures were isolated that are able to utilize only gaseous hydrocarbons as sole carbon source. Upon growth in an atmosphere of natural gas, these microorganisms develop in the form of closely connected associations consisting of a basic culture and bacterial satellites (representatives of Pseudonomas species). The basic bacterial culture possesses the capacity for active oxidation of natural gases; the bacterial satellites do not utilize them independently. Among these microorganisms, a group of bacteria was found for which ammonia nitrogen is toxic. A new modification of synthetic medium is presented, the use of which promotes the isolation of new forms of gas-oxidizing bacteria. The composition of this medium, in percent, is as follows: 0.1 KNO3; 0.1 KH2PO4; 0.1 K2HPO4; 0.1 NaCl; 0.02 MgSO4; 0.002 CaCl2 and traces of FeCl3. The pH of the medium is 7.0-7.2, and the water used is distilled 200 ml and tap 800 ml. (Mortland-Battelle)
W71-11559

THE TOXICITY OF COPPER COMPLEXES TOWARDS SCENEDESMUS QUADRICAUDA BREB.,
Moscow State Univ. (USSR). Dept. of Hydrobiology.
V. G. Khobot'ev, V. I. Kapkov, and E. G. Rukhadze.
Microbiology (USSR), Vol 38, No 5, p 729-731, September-October 1969. 2 tab, 8 ref.

Descriptors: *Copper, *Toxicity, *Algae, *Water pollution effects, Chelation, Spectrophotometry, Nutrients, Heavy metals.
Identifiers: Protococcus, Scenedesmus quadricauda.

The toxic effects of copper on protococcal algae were studied using two types of copper compounds: chelates, the majority of which are soluble in water (copper bis-o-hydroxyquinoline, copper bis-o-vanillal, and copper bis-o-vanillalmethylimine), and a complex of copper with pyridine (copper dichloride pyridinate). Concentrations of 0.64-32 mg copper/liter of medium free from K sub 2 CO sub 3 and KH sub 2 PO sub 4 were used. The results showed the copper complexes to have a toxic action on the algae. The greatest toxic action was shown by copper dichloride pyridinate, which at concentrations of 0.4 mg copper/liter reduced the number of alga cells by four times after the seventh day as compared with the control. Copper chelates also showed toxic action but at somewhat larger concentration. The least toxic was copper bis-o-hydroxyquinoline, which at all concentrations tested only inhibited growth. (Mortland-Battelle)
W71-11561

CERTAIN ASPECTS OF PRODUCTION AND STANDING STOCK OF PARTICULATE MATTER IN THE SURFACE WATERS OF THE NORTHWEST ATLANTIC OCEAN,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
W. H. Sutcliffe, Jr., R. W. Sheldon, and A. Prakash.
Journal Fisheries Research Board of Canada, Vol 27, No 11, p 1917-1926, November 1970. 7 fig, 1 tab, 25 ref.

Descriptors: *Carbon, *Chlorophyll, *Seawater, *Aquatic production, *Biomass, Organic matter, Atlantic Ocean, Growth rates, Algae, Incubation, Phytoplankton.
Identifiers: *Adenosine triphosphate, *Deoxyribonucleic acid, Sample preservation, Coulter Counter.

Samples collected during January and October 1968 from 44 degrees to 19 degrees N in the western North Atlantic were analyzed for particulate organic carbon, ATP, DNA, chlorophyll a and total particulate volume between 1 and 40 micron diameter. Although the ratio of chlorophyll to ATP decreased from north to south, the ratio of particulate carbon to ATP did not show any systematic trend. A good correlation was found between ATP and DNA even though the DNA concentration was too great to be entirely representative of living material. Growth or production of particulate material as measured by the Coulter Counter method was higher than that measured by C-14 method. A trend was noted towards higher specific growth rate with smaller standing crop in southern waters. (Little-Battelle)
W71-11562

SELECTIVE INHIBITION OF CERTAIN ENTERIC BACTERIA BY SELENITE MEDIA INCUBATED AT 35 AND 43 C,
Saskatchewan Univ., Saskatoon. Western Coll. of Veterinary Medicine.
J. Greenfield, and C. H. Bigland.
Canadian Journal of Microbiology, Vol 10, No 12, p 1267-1271, December 1970. 1 fig, 3 tab, 4 ref.

Descriptors: *Salmonella, *E. coli, *Isolation, *Enteric bacteria, Toxicity, Pseudomonas, Analytical techniques, Separation techniques, Sewage, Shigella, Cultures.
Identifiers: Selenium, Arizonae, Selenite Broth, Feces, Salmonella choleraesuis, Salmonella gallinarum, Salmonella pullorum, Salmonella typhi, Proteus mirabilis, Escherichia freundii, Pseudomona aeruginosa, Shigella sonnei.

Selenite broth (SB) is a useful enrichment medium for isolating certain salmonellae and arizonae from specimen materials contaminated with competitive bacteria. Pure cultures of pseudomanas, proteus, and some coliform strains were suppressed more markedly by SB media containing additional selinite than the salmonellae and arizonae tested. Some very closely related organisms showed conspicuously different results and whereas many serotypes of Escherichia coli were inhibited, others fluorished in the test environments. Selenite media were more toxic to some salmonellae than to others, and Salmonella choleraesuis, Salmonella gallinarum, Salmonella pullorum, and Salmonella typhi did not grow well, especially at 43C. Selenite broth incubated at 43C proved to be more toxic to all test cultures than incubation at 35C, but in general the salmonellae and arizonae were inhibited less than the extraneous bacteria with which they are often associated. (Mortland-Battelle)
W71-11568

A BIOLOGICAL APPROACH TO WATER QUALITY MANAGEMENT,
J. R. Chandler.
Water Pollution Control, Vol 69, No 4, p 415-422, 1970. 3 fig, 7 tab, 6 ref.

Descriptors: *Water pollution effects, *Bioindicators, *Analytical techniques, *Water quality, *Biological communities, *On-site data collections, *Sampling, *Streams, Water analysis, Dominant organisms, Ecotypes, Ecosystems, Habitats, Aquatic environment, Environmental effects.
Identifiers: *Data analysis, Pollution gradient, Pollution zones, Pollution evaluation.

Biological methods are discussed which can be used in conjunction with information from other disciplines to assess the condition of rivers and streams. Chemical data, it is observed, certainly have their value, but the temptation to treat rivers like machines and to blindly follow the figures must be resisted. The concept that pollution is essentially a biological problem is strongly advocated. Methods of stream sampling and of sample examination and analysis are reviewed. The validity of the 'indicator organisms,' the 'species diversity,' and the 'biotic index' concepts is examined. Sampling methods have a certain degree of bias, and it is unlikely that a truly quantitative sampling method will ever be evolved for routine universal use. (LeGore-Washington)
W71-11579

THE ISOLATION OF VIRUSES FROM SEWAGE AND TREATED SEWAGE EFFLUENTS,
Council for Scientific and Industrial Research , Pretoria (South Africa). National Inst. for Water Research.
For primary bibliographic entry see Field 05A.
W71-11580

THE FLAGFISH, JORDANELLA FLORIDAE, AS A LABORATORY ANIMAL FOR BEHAVIORAL BIOASSAY STUDIES,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology.
N. R. Foster, J. Cairns, Jr., and R. L. Kaesler.
Proceedings of the Academy of Natural Sciences of Philadelphia, No 121, No 5, p 129-152, 1969. 2 fig, 17 tab, 11 ref.

Descriptors: *Bioassay, *Bioindicators, *Laboratory animals, *Fish behavior, Analytical techniques, Water pollution effects, Surfactants, Detergents, Alkylbenzene sulfonates, Fish physiology, Pollutant identification, Toxicity, Lethal limit, Water quality, Environmental effects, Aquatic environment, Social behavior (animal), Water analysis.
Identifiers: *Jordanella sp., *Flagfish.

Following a brief review of some of the problems and criteria involved in the selection of fish species for behavioral bioassay studies, the attributes of and the techniques involved in using the flagfish, Jordanella floridae (Cyprindontidae), as a laboratory test fish are described. The results of various experiments, including some in which the behavioral repertoires of individual breeding males were monitored daily both before and after exposure to sublethal concentrations of detergent (alkyl benzene sulfonate), are presented and analyzed. Some suggestions for improving the behavioral bioassay techniques used are discussed. (LeGore - Washington)
W71-11581

SOME EFFECTS OF DISSOLVED OXYGEN CONCENTRATIONS UPON THE TOXICITY OF

ZINC TO THE BLUEGILL, LEPOMIS MACROCHIRUS, RAF,
Federal Water Pollution Control Administration, Cincinnati, Ohio Newtown Fish Toxicology Lab.
Quentin H. Pickering.
Water Research, Vol 2, p 187-194, 1968. 5 tab, 13 ref.

Descriptors: *Dissolved oxygen, *Toxicity, *Heavy metals, *Fish physiology, *Sunfishes, Bioassay, Lethal limit, Mortality, Morbidity, Growth rate, Water pollution effects, Industrial wastes, Lepomis species, Weight.
Identifiers: Synergism, Antagonism, Chronic toxicity, Zinc.

Randomized duplicate continuous-flow bioassays were made to determine the effect of three dissolved oxygen concentrations (1.8, 3.2, and 5.6 mg/1) on subacute toxicity of zinc to bluegills. The 20-day median tolerance limits (TLm) at various oxygen concentrations were significantly different at the 95% level of confidence, but the effects of zinc concentrations on growth were not significant. Bluegills exhibited increased sensitivity to zinc as a result of low dissolved oxygen concentrations. (LeGore - Washington)
W71-11582

OCCURRENCE AND DISTRIBUTION OF DIATOMS AND OTHER ALGAE IN THE UPPER POTOMAC RIVER,
Virginia Polytechnic Inst. and State Univ., Blacksburg; Kansas Univ., Lawrence; and Academy of Natural Sciences of Philadelphia, Pa.
John Cairns, Jr., Roger L. Kaesler, and Ruth Patrick.
Notulae Naturae of the Academy of Natural Sciences of Philadelphia, No. 436, Dec 22, 1970. 12 p, 3 fig, 2 tab, 12 ref.

Descriptors: *Water pollution effects, *Diatoms, Water pollution sources, Industrial wastes, Aquatic algae, Bioindicators, Bioassay, Algae, Powerplants, Effluents, Discharge (Water), Statistical models.
Identifiers: *Species diversity, *Potomac River.

Ten limnological surveys were made of a portion of the upper Potomac River in conjunction with installation and expansion of the Dickerson power station of the Potomac Electric Power Company. Cluster analyses of matrices of Jaccard coefficients computed from presence-absence data on (1) 344 species of diatoms in 46 aggregations, and (2) 161 species of other algae in 50 aggregations yielded results in agreement with those obtained in similar studies of protozoans and insects and also with results of species diversity studies. These studies indicate that the populations of diatoms in these areas were very similar before and after plant operations started, and there was no evidence from the diversity or kinds of species of adverse effects due to power plant discharge. (LeGore - Washington)
W71-11583

INTERNAL DAMAGE IN AN AQUATIC BEETLE EXPOSED TO SUBLETHAL CONCENTRATIONS OF INORGANIC IONS,
Pennsylvania State Univ., Abington.
Corrine R. Wooldridge, and David P. Wooldridge.
Annals of the Entomological Society of America, Vol 62, No 4, p 921-922, 1969. 1 tab, 5 ref.

Descriptors: *Metals, *Water pollution effects, *Bioindicators, *Inorganic compounds, *Animal pathology, Heavy metals, Bioassay, Cobalt, Manganese, Chromium, Magnesium, Copper, Calcium, Aluminum, Molybdenum, Iron, Ions, Physiological ecology, Aquatic insects.
Identifiers: *Beetles, Zinc, Cadmium, Nickel, Tropistermus sp., Animals morphology.

The effects are reported of metal ions (cobalt, manganese, chromium, magnesium, zinc, cadmium, copper, nickel, calcium, aluminum, molybdenum and iron) in sublethal concentrations upon the gross internal anatomy of adult aquatic beetles (Tropistermus lateralis nimbatus). All test solutions were .003 M. The fat body was the first and most severely affected tissue, its color changing from lemon yellow to white through shades of very dark orange. Other, less universal, changes are also described. Variations in gonadal condition would be the most useful criterion for determining inorganic contamination of the aquatic habitat of this organism. (LeGore - Washington)
W71-11586

TOXICITY OF KRAFT PULP MILL EFFLUENT FOR LARVAL AND ADULT LOBSTERS, AND JUVENILE SALMON.
Fisheries Research Board of Canada, St. Andrews (New Brunswick) Biological Station.
J. B. Sprague, and D. W. McLeese.
Water Research, Vol 2, p 753-760, 1968. 2 fig, 1 tab, 13 ref.

Descriptors: *Pulp wastes, *Water pollution effects, *Atlantic salmon, *Lobsters, Bioassay, Pulp and paper industry, Lethal limit, Water pollution sources, Toxicity, Mortality, Resistance, Industrial wastes.
Identifiers: *Kraft mill effluent, Homarus sp., Salmo sp.

The lethal threshold concentration of neutralized (pH 7.0) bleached kraft pulp mill effluent for juvenile Atlantic salmon (Salmo salar) is about 12-15% in fresh water. This agrees in general with work on other salmonid fish. Larval lobster (Homarus americanus) are reasonably resistant to this waste, and concentrations below 10% did not greatly affect their survival in sea water. Adult lobsters in sea water are more resistant than lobster larvae or salmon parr. (LeGore - Washington)
W71-11587

HEAVY METALS AND THE FERTILIZATION OF RAINBOW TROUT EGGS,
Water Pollution Research Lab., Stevenage (England).
T. L. Shaw, and V. M. Brown.
Nature, Vol 230, No 5291, p 251, 1971. 1 fig, 2 tab, 4 ref.

Descriptors: *Heavy metals, *Water pollution effects, *Copper, *Rainbow trout, *Fish eggs, Metals, Bioassay, Growth stage, Physiological ecology, Eggs, Hatching, Reproduction.
Identifiers: *Nickel, Salmo sp., Egg viability.

Results of preliminary inquiry into the effects of copper and nickel on the fertilization of rainbow trout (Salmo gairdneri) eggs are reported. Samples of eggs from a single female and sperm from a single male were subjected either to 1.0 mg of Cu.... per liter or to 1.0 mg of Ni.... per liter, or served as the control. Differences in per cent of fertilized eggs hatching were not statistically significant (P greater than 0.05). Eggs exposed to the metals, however, developed more rapidly than the control eggs. (LeGore - Washington)
W71-11588

USING BAYTEX (BAY 29493) TO CONTROL CRAYFISH IN PONDS,
Kansas Forestry, Fish and Game Commission, Pratt.
Johnny Ray, and Verl Stevens.
Unpublished mimeographed report, 1968. 5 p, 4 tab.

Descriptors: *Insecticides, *Pesticides, *Chemcontrol, *Water pollution effects, *Lethal limit, *Crayfish, *Pesticide toxicity, Agricultural chemicals, Bioassay, Fish farming, Poisons, Toxicity, On-site tests, Channel catfish.
Identifiers: *Baytex.

The problems caused by large numbers of crayfish in channel catfish rearing ponds are numerous. In searching for a control measure, the effects of Baytex (Bay 29492) on crayfish were determined in field tests. The pesticide was very effective at concentrations greater than 100 ppb when efficient distribution measures were utilized. At 50 ppb, Baytex is very effective against aquatic diptera. The insecticide apparently does not harm fish at 250 ppb, although considerable change in planktonic fauna is evident. (LeGore - Washington)
W71-11589

PIKE (ESOX LUCIUS L.) AND SOME OTHER AQUATIC ORGANISMS IN SWEDEN AS INDICATORS OF MERCURY CONTAMINATION IN THE ENVIRONMENT,
Naturhistoriska Riksmuseet, Stockholm (Sweden); Royal Inst. of Tech., Stockholm (Sweden); and Isotoptekniska Laboratoriet, Stockholm (Sweden).
A. G. Johnels, T. Westermark, W. Berg, P. I. Persson, and B. Sjostrand.
Russian summary. Oikos, Vol 18, p 323-333, 1967. 4 fig, 7 tab, 25 ref.

Descriptors: *Metals, *Heavy metals, *Water pollution effects, *Bioindicators, Path of pollutants, Fish physiology, Physiological ecology, Water analysis, Environmental effects, Aquatic environment, Environmental sanitation, Public health, Disposal, Sanitary engineering.
Identifiers: *Mercury, *Mercury pollution.

Mercury content of pike (Esox lucius) was determined with activation analysis, and concentration factors from water to pike were 3000 or greater. The relationship between mercury content and weight and age of fish specimens is discussed. Geographical comparison of several areas is made. The effect of industrial contamination is demonstrated by a comparison of mercury content of samples of pike from above and below mercury-containing effluent outfalls. Several sources of mercury are discussed. (LeGore - Washington)
W71-11590

TOXICOLOGICAL ASSAYS WITH FISH,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
Leif L. Marking.
Bulletin of the Wildlife Disease Association, Vol 5, p 291-294, July 1969. 3 tab.

Descriptors: *Bioassay, *Water pollution effects, *Toxicity, *Laboratory facilities, *Water quality, Bioindicators, Laboratory animals, Fish physiology, Fish behavior, Fishkill, Mortality, Analytical techniques.

The importance of and philosophy behind fish bioassay studies are reviewed, and the standard procedures used at the Bureau of Sport Fisheries and Wildlife, Fish Control Laboratories in La Crosse, Wisconsin, are described. Such aspects as numbers of test fish, feeding, water quality and water temperature are discussed. (LeGore - Washington)
W71-11591

EFFECTS OF AERIAL SUMITHION SPRAYING ON JUVENILE ATLANTIC SALMON (SALMO SALAR L.) AND BROOK TROUT (SALVELINUS FONTINALIS MITCHILL) IN NEWFOUNDLAND,
Dept. of Fisheries and Forestry, St. John's, Newfoundland, Canada. Department of Fisheries and Forestry, St. John's (Newfoundland).
C. T. Hatfield, and L. G. Riche.
Bulletin of Environmental Contamination and Toxicology, Vol 5, No 5, p 440-442, 1970. 1 tab, 6 ref.

Descriptors: Organophosphorous pesticides, *Pesticide residues, *Pesticide toxicity, *Chemcontrol, *Water pollution effects, *Forest management, Pesticides, Pesticide drift, Pesticide kinetics, Agricultural chemicals, Fish physiology, Physiological ecology, Water pollution sources, Hemlock trees, Atlantic salmon, Brook trout, Environmental effects, Water quality.

Identifiers: *Sumithion, Phosphamidon, Hemlock looper, Salmo sp., Salvelinus sp.

An organophosphorous pesticide, Sumithion, was applied over 2.1 million acres of Newfoundland forest to control the hemlock looper. A study on the effects of the spraying on fish is reported. Caged salmon and brook trout were held in water systems inside and outside the spray plots, and these and captured wild fish were analyzed by gas chromatography. Forest sprays of Sumithion at 2-3 oz/acre were less acutely harmful to fish than were past sprays of DDT, but that possible indirect or chronic effects cannot be discounted. (LeGore - Washington)
W71-11592

THERMAL ACCLIMATION AND TEMPERATURE SELECTION IN ATLANTIC SALMON, SALMO SALAR, AND RAINBOW TROUT, S. GAIRDNERI,
Carleton Univ., Ottawa (Ontario).
M. Y. Javaid, and J. M. Anderson.
Journal of the Fisheries Research Board of Canada, Vol 27, No 7, p 1507-1513, 1967. 2 fig, 1 tab, 10 ref.

Descriptors: *Water temperature, *Fish behavior, *Acclimatization, *Thermal pollution, Temperature, Rainbow trout, Atlantic salmon, Environmental effects, Thermal stratification, Heated water, Thermal stress, Bioassay, Aquatic environment.
Identifiers: *Temperature preference, *Thermal gradients, Thermal effluent, Salmo sp.

The selected temperature for Atlantic salmon and rainbow trout, as determined in a horizontal gradient, increases with acclimation temperature over the acclimation range 5-20 C for salmon and 10-20 C for trout. The final preference for salmon is about 17 C. The results for rainbow trout suggest that the type of gradient used, i.e. vertical vs. horizontal, has a marked influence on the experimentally determined relationship between acclimation temperature and selected temperature. (LeGore - Washington)
W71-11593

CONCENTRATIONS OF DIELDRIN IN THE BLOOD AND BRAIN OF THE GREEN SUNFISH, LEPOMIS CYANELLUS, AT DEATH,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
Roger L. Hogan, and Eugene W. Roelofs.
Journal of the Fisheries Research Board of Canada, Vol 28, No 4, p 610-612, 1971. 3 fig, 1 tab, 9 ref.

Descriptors: *Fish physiology, *Water pollution effects, *Dieldrin, *Pesticide toxicity, *Pesticide residues, *Sunfishes, Fishkill, Mortality, Morbidity, Pesticide kinetics, Absorption, Path of pollutants, Bioassay, Lethal limit, Chlorinated hydrocarbon pesticides, Lepomis species.
Identifiers: *Residue distribution, Fish brain, Fish blood, Fish tissues.

When green sunfish, Lepomis cyanellus, were exposed to concentrations of dieldrin averaging 6.0 ppb for periods ranging from 124 to 139 hr, the concentrations of dieldrin in the blood and brain at death were approximately 6.0 and 9.0 ug/g. Surviving fish had concentrations markedly lower than those that died. A correlation coefficient of 0.95 was found between concentrations of dieldrin in the blood and in the brain, water dieldrin concentrations having a slight influence on the concentrations in the blood at death. Surviving fish exhibiting severe poisoning symptoms had higher concentrations of dieldrin in the blood and brain than did those showing moderate to minimal symptoms. (LeGore - Washington)
W71-11595

DIESEL OIL SPILL AT ANACORTES,
Alberta Univ., Edmonton. Dept. of Zoology.
Fu-Shiang Chia.
Marine Pollution Bulletin, Vol 2, No 7, p 105-106, Jul 1971. 1 fig.

Descriptors: *Oil, *Oily water, *Water pollution effects, *Bioindicators, *Fishkill, *Mortality, Oil wastes, Water pollution sources, Surveys, Aquatic environment, Water quality, Morbidity, Environmental effects, Washington.
Identifiers: *Oil spills, *Oil pollution, Diesel fuel, Biological effects, Anacortes (Wash).

In April, 1971, over 750,000 liters of no. 2 diesel oil were spilled from a barge into Puget Sound. The courses of the oil are traced and its biological effects are considered. Bird injury and mortality constituted the most obvious consequences of the spill. Invertebrate animals on the south beach of Guemes Island were, it is reported, heavily damaged. Among the most severely affected were brittle stars, polychaetes, nemerteans, chitons, hermit crabs and limpets. Animals at higher intertidal regions were more severely damaged than those of the lower intertidal regions. (LeGore - Washington)
W71-11596

TOXICITY OF MIREX TO CRAYFISH, PROCAMBARUS BLANDINGI,
Mississippi State Univ., State College. Dept. of Zoology.
J. Larry Ludke, M. T. Finley, and Christina Lusk.
Bulletin of Environmental Contamination and Toxicology, Vol 6, No 1, p 89-96, 1971. 4 tab, 7 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Pesticide toxicity, *Mortality, *Lethal limit, *Crayfish, *Commercial shellfish, *Water pollution effects, *Chemcontrol, Pesticide kinetics, Pesticide residues, Pesticide drift, Bioassay, Crustaceans, Agricultural chemicals, Balance of nature, Toxicity, Poisons.
Identifiers: *Mirex, *Fire ants, Procambarus sp., Non-target organisms.

A 12-yr plan to eradicate the imported fire ant by treating about 120 million acres of the southeastern United States three times with 1.25 pounds of Mirex bait per acre per treatment has been proposed. In light of the economic importance of the crayfish in the area, a study was conducted to determine the sensitivity of crayfish to low concentrations of Mirex. Juvenile crayfish were challenged in static bioassay. Mortality approached 100% in 5 days after a 144 hr exposure to 1.0 ppb, and exposure to 5 ppb for 6, 24 and 58 hr yielded 26, 50 and 98% mortality respectively ten days later. Effects of Mirex via leaching and oral exposure were also assayed. Crayfish were found to be extremely sensitive to Mirex through direct and indirect exposure. (LeGore - Washington)
W71-11597

POISONING WITH DDT: SECOND- AND THIRD-YEAR REPRODUCTIVE PERFORMANCE OF ARTEMIA,
North Carolina State Univ., Raleigh.
Daniel S. Grosch.
BioScience, Vol 20, No 16, p 913, Aug 15, 1970. 1 tab, 8 ref. USPHS Grant ES-00044.

Descriptors: *DDT, *Lethal limit, *Life cycles, *Resistance, *Pesticide residues, *Pesticide toxicity, *Persistence, Chlorinated hydrocarbon pesticides, Bioassay, Water pollution effects, Age, Biorhythms, Ecology, Growth stage, Pesticide kinetics, Brine shrimp, Shell fish.
Identifiers: *Artemia sp., Chronic pollution.

After initial exposure to DDT, cultures of Artemia sp. were maintained for several generations. Genetic disturbances were not demonstrated, but low levels of DDT persisted in the populations. Cyclic susceptibility corresponding to the life cycles of the populations resulted in a periodic attrition. Although non-genetic in character, the cyclic coexistence of pesticide residue and vulnerable stage in a life cycle can influence many generations. (LeGore - Washington)
W71-11598

RAPID MICRODETECTION OF ORGANOCHLORINE PESTICIDES IN SUBMILLIGRAM FISH TISSUE SAMPLES,
Miami Univ., Fla. Inst. of Marine Sciences.
For primary bibliographic entry see Field 05A.
W71-11599

DDT AND PCB IN MARINE ANIMALS FROM SWEDISH WATERS,
Stockholm Univ. (Sweden). Institutionen for Analytisk Kemi, Havsfiskelaboratoriet, Lysekil (Sweden); and Naurhistoriska Riksmuseet, Stockholm (Sweden).
S. Jensen, A. G. Johnels, M. Olsson, and G. Otterlind.
Nature, Vol. 224, No. 5216, p 247-250, 1969. 1 fig, 1 tab, 21 ref.

Descriptors: *DDT, *Chlorinated hydrocarbon pesticides, *Industrial wastes, *Agricultural chemicals, *Pesticide residues, *Water pollution sources, Pesticide drift, Path of pollutants, Bioassay, Bioindicators, Chemical wastes, Hazards, Public health, Water pollution effects, Marine animals, Marine fish.
Identifiers: *Polychlorinated biphenyls, DDE, PCB, Sweden, Gulf of Bothnia, Baltic Sea, North Sea.

Analyses for pesticide residues in a wide range of marine organisms from Sweden's coastal waters indicate a marked contamination of the Baltic Sea. Samples from mussels, herring, plaice, dogfish, cod, salmon, seals, guillemot, eagles and a heron were studied. DDE was the principal metabolite of DDT found. Rough quantitative determinations were made of polychlorinated biphenyl (PCB) residues. In the Baltic proper, the Gulf of Bothnia and in the archipelago of Stockholm, the levels of chlorinated hydrocarbons are approximately ten times greater than the reported figures for comparable species in the North Sea and in the Atlantic Ocean. (LeGore-Washington)
W71-11600

ANIMALS FERAE NATURAE--COMMONWEALTH NOT PERMITTED TO RECOVER DAMAGES IN TRESPASS FOR NEGLIGENT KILLING OF FISH BY POLLUTION,
William S. Kieser.
Dickinson Law Review, Vol 72, p 200-207, 1967, 8 p, 42 ref, append.

Descriptors: *Pennsylvania, *Fish management, *Water pollution effects, *Remedies, State jurisdiction, Water pollution control, Pollution abatement, Water pollution, Water pollution sources, Pollutants, Fishkill, Wildlife conservation, Land tenure, Fish, Fish conservation, Aquatic environment, Streams, State governments, Public rights, Damages, Legislation, Judicial decisions, Legal aspects.
Identifiers: *Ownership of fish.

A recent case dealing with state ownership of fish within its streams is criticized. In the case, a polluter violated certain statutes and destroyed stream fish. The state sought civil damages for the fish and stream habitat destruction. The Pennsylvania Superior Court, affirming a dismissal of the complaint, held that the penal remedy for the statutory violation was exclusive and that the state did not have a sufficient property interest in wild fish to support an action for damages. The author notes that at common law wild animals were subject to ownership only by possession. The argument is made that a state in its quasi-sovereign capacity is entitled to bring suit for the public benefit as trustee of a valuable natural resource. Pollution is detrimental to the public at large, and polluters may be enjoined to abate a public nuisance. Polluters should also be subject to civil suit for damages to the public's natural resources. A statute passed in response to the case and aimed at reducing the menace of pollution and fish destruction allows the

state to sue for damages to aquatic life caused by pollution. (Smiljanich,Florida)
W71-11627

5D. Waste Treatment Processes

RETURNING WASTES TO THE LAND, A NEW ROLE FOR AGRICULTURE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
Herman Bouwer.
Journal of Soil and Water Conservation, Vol 23, 1968, p. 164-168, 2 fig, 1 tab, 22 ref.

Descriptors: *Irrigation, *Water reuse, *Waste disposal, Sewage effluents, Water quality control.
Identifiers: *Waste water renovation, Land disposal.

This article discusses the use of land or soil to dispose of and treat domestic, industrial, and agricultural sewage and wastes. Several projects are mentioned where this is being done on an experimental or trial basis. The major objectives may be sludge removal, groundwater renewal, irrigation or a combination of the three. The soil purifies the waste. Nutrients are also supplied to plants if the amount of effluent applied is not excessive. The economics of land disposal is also discussed. A more detailed description is given of the Flushing Meadows Project near Phoenix, Arizona. (Parker-ISU)
W71-11053

MANAGING SWINE WASTES TO PREVENT POLLUTION,
Nebraska Univ., Lincoln. Agricultural Engineering Extension.
E. A. Olson.
Nebraska Farmer, April 1971, p. 18, 20, 22, 2 fig.

Descriptors: *Farm wastes, *Wastewater disposal, Lagoons, Waste storage, Settling basins, Hogs.
Identifiers: *Waste management, Nebraska Water Pollution Control Council.

The management of swine wastes to keep them from polluting our streams is one of the new production problems facing the swine producer. Site selection is especially important as related to odor problems and sufficient space for waste handling facilities. Runoff from swine lots must not reach streams. Therefore facilities must be built to store and dispose of wastes. This article discusses some systems and problems associated with swine waste disposal. (Parker-ISU)
W71-11055

BROODER-GROW CAGES OVER DEEP PIT,
Roland C. Hartman.
Poultry Digest, April 1971, p. 165-168.

Descriptors: *Poultry, *Farm wastes, Structural design, Ventilation, Waste storage.
Identifiers: Pit storage, Cages.

This article describes a brooder-growing house for pullets. The building measures 36' X 390' and has four 370' rows of double-decked cages on A-frames designed for starting 38,000 pullet chicks and rearing them until 20 to 22 weeks of age. The cages are set up over a deep pit. Air is exhausted from beneath the floor and brought in under the caves. Heat is supplied by a hot water pipe running down the center of each row of cages. (Parker-ISU)
W71-11056

DEEP PIT SLAT-FLOOR BREEDING HOUSE,
Roland C. Hartman.
Poultry Digest, December 1970, p. 580-583. Fig. 7.

Descriptors: *Poultry, *Farmwastes, Ventilation, Design data.
Identifiers: *Slatted floor, Evaporative cooling.

This is a description of a slatted floor confinement house for poultry breeding flocks. The building has a 6 feet-5 inches ceiling height room above a 6 feet-0 inch pit, all above ground level. Slats are made of 2 X 4's split to 1 7/8 inches X 1 7/8 inches. Fans draw air from the pit area. The air enters through continuous vents near the ceiling passing first through an evaporative cooler made of a fogger and cooling pad. INCHEShese units were built by Pace/Setter Inc. on the high desert near Hesperia, California. (Parker-ISU)
W71-11057

ANAEROBIC DIGESTION FAILURES,
Bergen County Sewer Authority, Little Ferry, N.J.
Herman R. Zablatzky, and Stanley A. Peterson.
Journal of Water Pollution Control Federation, Vol. 40, No. 4, p 581-585, 1968. 2 fig, 5 tab, 3 ref.

Descriptors: Anaerobic digestion, Sludge digestion, Discharge (Water), Lagoons, Laboratory tests, Sludge disposal, Municipal wastes.
Identifiers: Spectrophotometric analysis, Ammonium alkaline build-up.

A description is given of the conditions leading to digester failures at the Bergen County Sewer Authority's Little Ferry Plant and the effects of these failures on the method of sludge disposal. Anaerobic digestion at this plant functions as a flow-through process. Raw and excess sludges are prethickened in two picket-fence -type thickeners. The thickened sludge is then fed into digesters and discharged into a 25-acre, 60 ft. deep pit. This pit was used to store the sludge as ultimate disposal. During summer months, solids loadings to the plant decreased because of industrial and residential vacation shutdowns. Incoming wastewater showed signs of septic conditions resulting from anaerobic decomposition in the lines. The thickeners lost efficiency and yielded a less concentrated, more voluminous thickened sludge. Soon the first signs of a digester failure began to appear. This digester was isolated, but the additional load imposed on the remaining digesters proved detrimental. High-rate digester failure can be caused by either segregation of concentrated sludges or ammonia alkalinity greater than a threshold value. The feeding of low concentrations of raw sludges to high-rate digesters may cause failure by depletion of alkaline buffering materials, resulting in a reduction in volatile matter decomposed and causing conditions to become unfavorable for the microorganisms. (Hazen-ISU)
W71-11059

RETARDING EFFECT OF DESSICATION ON NITROGEN MINERALIZATION IN ORGANIC MANURES,
Indian Agricultural Research Inst., New Delhi. Div. of Soil Science and Agricultural Chemistry.
R. D. Laura, and M. A. Idnani.
Current Science, Vol. 40, No. 7, 1971, p 158. 1 tab, 3 ref.

Descriptors: *Drying, Nitrification, Nitrogen compounds, Nitrogen, Farm wastes.
Identifiers: Anaerobic fermentation, Microbial decomposition, Nitrogen mineralization.

Nitrogen in organic manures of animal or vegetable origin is complex in chemical nature due to its presence in the form of proteinaceous compounds which are largely insoluble in water. If such nitrogen is to be transformed to mineral forms which are easiy available to plants, the parent materials must be subjected to the agencies of decomposition in the soil. The effect of drying on the quantity of nitrogen mineralized in an animal manure, viz., dung spent-slurry is the object of an investigation. Sun-drying of spent-slurry has drastically reduced the rate of nitrogen mineralization. The reason may be irreversible desiccation of organic colloids of the manure on sun-drying and thus their increased resistance to subsequent microbial decomposition in soil. The conclusion is that apart from the chemical composition of an organic manure, the treatment given to it before applying to soil should also be taken into consideration while evaluating its nitrogen supplying power to growing plants. The practical implication is that to exploit full potential of the benefits that can be obtained from organic manures, they should never be subjected to drying before applying. (Hazen-ISU)
W71-11060

STATE OF THE ART REVIEW: TREATMENT AND DISPOSAL OF SWINE WASTES,
Mississippi State Univ., State College, and Soil Conservation Service, New Albany, Miss.
Adnan Shindala, and James H. Scarbrough.
Water and Sewage Works, Vol. 118, No. 2, p 50-57, February 1971. 2 fig, 4 tab, 44 ref.

Descriptors: *Odor, *Waste treatment, *Waste disposal, Chemical oxygen demand, Water pollution, Air pollution, Lagoons, Anaerobic digestion, Disposal, Farm wastes, Cattle, Confinement pens, Hogs, Biochemical oxygen demand, Alkalinity, Design criteria.
Identifiers: Odor production, Odor control, Environmental control, Swine, Characteristics, Loading rates.

Confinement production of animals yields large volumes of animal wastes which constitutes a tremendous oxygen demand on natural streams if not disposed of properly. Animal wastes disposal has become one of the major problems facing the livestock industry today. Among the many combinations of processes suggested for the treatment of animal wastes, lagooning has received the widest acceptance. The low cost of construction and operation of lagoons has resulted in their wide adoption for the treatment of all types of animal wastes. If properly located, designed, constructed, and maintained, anaerobic lagoons provide the most economical means of treating and disposal of swine wastes. Effluents from anaerobic lagoons are offensive and must receive further treatment. Anaerobic lagoons must only be used as an initial step rather than a complete facility and must be followed by other means of treatment prior to adequate and safe disposal of the effluents. (Hazen-ISU)
W71-11061

METABOLIC FATE OF UBIQUINONE-7 Isolation and Identification of Metabolites in the Urine, Liver, Bile and Feces,
Takeda Chemical Industries Ltd., Osaka (Japan). Biological Research Labs.
Takeshi Fujita, Shigeharu Tanayama, and Ziro Suzuoki.
Journal of Biochemistry, Vol. 69, No. 1, 1971, p 63-71, 9 fig., 2 tab., 17 ref.

Descriptors: Radioactivity, Urine, Laboratory tests, Chromatography, Chemical analysis, Chemical properties.
Identifiers: *Ubiquinone-7, Urinary metabolites, Acid chromatography.

The metabolic conversion of methoxy-14C-labeled ubiquinone-7 was investigated in the rat following intravenous injection. From urine two radioactive metabolites were isolated and identified. The major metabolite is a new compound whose structure is 2,3-dimethoxy-5-methyl-6 (3'-methyl)-1, 4-benzoquinone (compound B) whereas the other one is gamma-lactone of 2,3-dimethoxy-5-methyl-6- (5'-carboxypentyl-3'-hydroxy-3'-methyl)-1, 4-benzo-quinone (compound A). Compound B accounted for about half of the urinary metabolites and compound A a quarter. Both metabolites were excreted as conjugates into urine. About 90% of the hepatic radioactivity was identified as unchanged ubiquinone-7. Chromatographic examinations indicated the occurrence of compounds A and B in bile and feces, presumably as conjugates. The main biotransformation of ubiquinone-7 was thus proved to be oxidative shortening of the side chain. The chain with 7 isoprenoid units was eventually degraded to 3-carboxy-3-methylpropyl group in compound B via 5-carboxypentyl-3-hydroxy-3-methyl group in compound A, possibly

due to Beta-oxidation of the latter. Metabolic conversion of ubiquinone-7 to ubiquinone-9 or ubiquinone-10 was not recognized in the present studies. (Hazen-ISU)
W71-11062

OIL SPILL TECHNOLOGY MAKES STRIDES,
American Chemical Society, Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11066

THE ENHANCEMENT OF VIRAL INACTIVATION BY HALOGENS,
Johns Hopkins School of Hygiene and Public Health, Baltimore, Md. Dept. of Environmental Health.
For primary bibliographic entry see Field 05B.
W71-11085

DETERGENT POLLUTION CONTROL ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO ESTABLISH STANDARDS AND PROGRAMS TO ABATE AND CONTROL WATER POLLUTION BY SYNETHETIC DETERGENTS).
For primary bibliographic entry see Field 06E.
W71-11159

NEW YORK STATE ENVIRONMENTAL FACILITIES CORPORATION ACT.
For primary bibliographic entry see Field 06E.
W71-11171

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W71-11225

RULES AND REGULATIONS FOR SEWERAGE SYSTEMS AND WASTE TREATMENT WORKS.
Arizona State Dept. of Health, Phoenix.

Rules and Regulations secs 2-3-1.1 thru 2-3-6.4, Arizona State Dep't of Health, Phoenix, Ariz (1962). 5 p.

Descriptors: *Arizona, *Treatment facilities, *Water quality control, *Waste water treatment, Administrative agencies, Sanitary engineering, Construction, Regulation, State governments, Local governments, Administrative decisions, Legal aspects, Water pollution, Water quality, Pollution abatement, Environmental sanitation, Environmental engineering, Public health, Sewage disposal, Sewage treatment, Wastes, Waste treatment, Industrial wastes, Water pollution control.

No sewage or industrial wastes shall be allowed to flow into any of the waters of Arizona if such flow would be detrimental to the quality of receiving waters. Cesspools are prohibited, and limitations are imposed upon the use of septic tanks. An application must be submitted to the local health department or the State Department of Health before the construction of contracting for the construction of any sewerage system, sewerage system extension, waste treatment works, or reclamation system. The contents of such applications and applicable administrative procedures are herein set forth. Design requirements are also provided. Sewage and industrial waste treatment works shall be operated at their highest practical efficiency. Technical requirements for the cross-connections of water and sewer pipes are explained. Tests and records are herein required of disposal plants. Approval is required for the irrigational use of sewage or industrial waste effluents. The discharge of wastes into wells, creviced formations, or from boats is forbidden. Permissable types of marine toilets and dockside facilities are specified. Waste rock, mill tailings, and smelter slag are excluded from these regulations. (Robinson-Florida)
W71-11266

A CONVENIENT METHOD FOR ISOLATION OF SALMONELLA FROM SEWAGE AND CONTAMINATED SEA WATER,
Israel Ministry of Health, Tel Aviv. Public Health Lab.
Y. Yoshpe-Purer, Sh. Ricklis, and M. Paist.
Water Research, Vol 5, No 3, March 1971. p 113-129, 5 tab, 15 ref.

Descriptors: *Sea water, *Water pollution treatment, *Sewage, *Salmonella, *Isolation, Application methods, Enteric bacteria, Waste dilution, California, Waste water treatment.
Identifiers: *Triple strength selenite, Membrane filtration, Moore pads.

Several methods for concentrating and isolating salmonellae from sewage and contaminated waters are compared. A new method based on concentrating the enrichment medium, triple strength selenite broth (TSS), instead of the inoculum is presented and compared to the methods of membrane filtration and 'Moore pads'. Isolation rates attained by the TSS method were superior to membrane filtration and approximately the same as the 'Moore pads' but required less work. Confirmation of the importance of several consecutive platings from the enrichment medium was made. (Ensign-PAI)
W71-11296

A STATUS REPORT ON WASTE TREATMENT LAGOONS IN MISSISSIPPI,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
J. B. Allen, and J. C. McWhorter.
Available from the National Technical Information Service as PB-202 215, $3.00 in paper copy. Completion Report, Mississippi Water Resources Research Institute, State College, July 1971. 17 p, 2 fig, 7 tab, 4 ref. OWRR Project A-050-MISS (1).

Descriptors: Lagoons, Waste disposal, *Farm lagoons, *Mississippi, *Waste water treatment, *Oxidation lagoons, *Sewage lagoons, Sewage treatment, *Effluents, Sewage effluents, Costs, Biochemical oxygen demand.

The objective was to evaluate the current use of, and attitudes toward, lagoons as devices for waste treatment. Surveys were conducted in order to determine the location and number of both municipal and agricultural waste treatment lagoons. Selected lagoons were visited and chemical and bacteriological analyses of their effluents were performed. There were 216 municipal lagoon systems covering 2,972.5 acres of land. This total does not include privately owned lagoons serving subdivisions, trailer parks, schools, etc. There were 241 animal waste treatment lagoons, of which 221 were used for swine, 16 for dairy, and 4 for poultry. Chemical and bacteriological analyses were made of the effluents from 7 municipal lagoons and 5 animal waste lagoons. The BOD of the municipal lagoon effluents varied from 18.0 to 79.5 mg/l, while the BOD of the agricultural waste treatment lagoons ranged from 92 to 870 mg/l. Agricultural waste treatment lagoons have been readily accepted by farmers and the number of lagoons is expected to increase rapidly, partially because the federal government will cover 80% of the construction cost through the Rural Environmental Assistance Program.
W71-11299

HOW RHENIFORMING MAXIMIZES AROMATICS,
Chevron Research Co., Richmond, Va.
R. L. Jacobson, and C. S. McCoy.
Hydrocarbon Processing, Vol. 49, No. 5, p 109-112, May 1970. 6 fig, 5 tab, 2 ref.

Descriptors: *Oil industry, *Catalysts, Aromatic compounds, Hydrogen, Distillation, Chemical reactions, Separation techniques, Waste water treatment, Water reuse.
Identifiers: Rheniforming, Reforming process, Benzene, Toluene, Xylene, Chemical industry, Platinum rhenium catalysts.

Rheniforming is a catalytic reforming process that maximizes the yield of aromatics during refining. The catalysts are platinum-rhenium. Refiners now taking advantage of this process are realizing higher yields of reformate and hydrogen. For production of benzene, toluene, and xylene concentrates, containing 95-98 percent aromatics, high severity Rheniforming plus distillation offers significant savings over conventional reforming, extraction and distillation. The feasibility of high severity Rheniforming, including operation at low pressure, has been demonstrated in commercial units. (McCann-Battelle)
W71-11311

MAKE ALDEHYDES BY NEW OXO PROCESS,
Union Oil Co. of California, Brea.
K. L. Olivier, and F. B. Booth.
Hydrocarbon Processing, Vol. 49, No. 4, p 112-114, April 1970. 3 fig, 1 tab, 4 ref.

Descriptors: *Oil industry, *Hydrogenation, *Oil wastes, Hydrogen, Alcohols, Acids, Oxidation, Catalysts, Waste water treatment, Water reuse.
Identifiers: *Aldehydes, Oxo process, Olefin, Carbon monoxide, Paraffin.

An improved hydroformylation process based on a highly selective rhodium catalyst has been developed. In this reaction an olefin, carbon monoxide, and hydrogen react to form aldehydes. The new hydroformylation works best on terminal olefins. Spacetime yields and selectivities are very high. The high conversions obtained make possible a once-through operation (no olefin recycle) and obviate the difficult separation of uncovered olefin from the small yield of byproduct paraffin. Aldehyde is obtained as the sole reaction product. This allows flexibility in further processing, e.g., hydrogenation to alcohol or oxidation to acid. (McCann-Battelle)
W71-11312

ACID MINE WASTE TREATMENT USING REVERSE OSMOSIS.
Gulf Environmental Systems Co., San Diego, Calif.

Available from the National Technical Information Service as PB-202 228, $3.00 in paper copy,. water Pollution Control Research Seires August 1971, 84 p, 3 fig, 30 tab, 10 ref. EPA Program 14010 DYG.

Descriptors: *Reverse osmosis, *Mine drainage, *Demineralization, *Iron, *Acid mine water, *Water reuse, Solubility, Brine treatment, West Virginia, Pennsylvania, Osmosis, Waste water treatment, Boiler feed water, Pre-treatment (Water), Membranes.
Identifiers: Norton (W Va), Morgantown (W Va), Ebensburg (Penn), Brine treatment, Cellulose acctute membrane, Ferrous ferric iron ratios, Calcium-sulfate solubility.

The basic objectives of this test program were to demonstrate the applicability of reverse osmosis to the demineralization of acid mine drainages, both high-ferrous and high-ferric types, and to reclaim the maximum percentage of such feedwater in purified form suitable for domestic or industrial purposes, or as stream discharge. These goals included the attainment of maximum water recovery while maintaining the required product water quality and the determination of pretreatment requirements necessary to maximize water recovery and membrane life. Two reverse osmosis test units were operated during the course of these tests: a nominal 10,000-gpd unit equipped with eighteen 50-ft modules and a nominal 4,000-gpd unit equipped with nine 50-ft modules. The modules used in these units consisted of both high-selectivity and high-flux cellulose acetate membranes. The test program was carried out at three different mine drainage sites. The mine drainage water at the first site, Norton, West Virginia, contained greater than 98 percent of the iron present in the ferric form; at the other two sites, Morgantown, West Virginia, and Ebensburg, Pennsylvania, the drainage water contained predominantly ferrous iron. Discharges

at the second site were so concentrated that recoveries were limited to 50 percent; recoveries of 80 to 90 percent were attained at the first and third sites. No iron fouling was encountered at any of the three sites. Specific salt rejections were 97 percent at all sites.
W71-11362

LIGHT CATALYZED CHLORINE OXIDATION FOR TREATMENT OF WASTEWATER,
Midwest Research Inst., Kansas City, Mo.
Alfred F. Meiners.
Copy available from GPO Sup Doc Wash, DC, $1.00; PB-202 230, $0.95. Water Pollution Control Research Series, Sept 1970, 105 p, 24 fig, 43 tab, 3 ref. EPA Program 17020 DUE 09/70.

Descriptors: *Ultraviolet radiation, *Chlorination, Oxidation, Irradiation, Wavelengths, Energy transfer, Light intensity, Adsorption, Chemical oxygen demand, Economic feasibility, Cost analysis, *Waste water treatment.
Identifiers: *Mercury arc lamps, *Quantum efficiency.

A small scale batch reactor and a larger scale batch- recycle reactor were used to determine optimum illumination and chlorine dose for oxidation of the soluble organics in secondary waste water effluent. Primary variables studied included wavelength effects, intensity-time relationships, quantum efficiencies, chlorine concentration, and the effect of dissolved oxygen. For optimal operation, light of low intensity and less than 300 wavelength, and chlorine of less than 5 mg/l should be used. Process cost estimates were made for a 10 mgd plant. Initial investments were estimated at $990,000. Fixed charges were estimated at 3.42 cents/1000 gal, and operating costs were figured as: (1) labor-2.79cents/1000 gal; (2) lamp replacement-$1.70/1000 gal, and (3) chlorine $2.09/1000 gal. With an additional $1.77/1000 gal for miscellaneous expenses, total operating costs were $8.35/1000 gal. Major assumptions used for cost estimation were: (1) 15 mg/l COD decrease required; (2) 1.30 quantum efficiency; (3) a stoichiometric amount of chlorine, and (4) continuous addition of caustic. Estimated overall costs were 11.77 cents/1000 gals. Further cost decreases may occur as the result of developments in: (1) more intense and/or more efficient lighting; (2) utilization of higher quantum efficiencies due to improved operating conditions, and (3) ways of reducing the dosages of chlorine and caustic required. (Lowry-Texas)
W71-11364

USE OF FUNGI IMPERFECTI IN WASTE CONTROL,
North Star Research and Development Inst., Minneapolis, Minn.
Brooks D. Church, and Harold A. Nash.
Copy available from GPO Sup Doc Wash, D.C., $1.00; from NTIS as PB-202 231. Water Pollution control Research Series, Jul 1970. 84 p, 28 fig, 22 tab, 23 ref. FWPCA Grant 12060 EHT 07/70.

Descriptors: *Corn (field), *Soy beans, *Fungi, Fermentation, Metabolism, Nitrogen, Phosphorus, Acids, Hydrogen ion concentration, Temperature, Dissolved oxygen, Incubation, Stability, Harvesting, Filtration, Diets, Digestion, Protein, Amino acids, Toxicity, Biochemical oxygen demand, Cost analysis, Waste water treatment.
Identifiers: *Mycelium.

Trichoderma viride, Gliocladium deliquescens and either Aspergillus oryzae or G. deliques cens were selected from a field including 45 species of 21 genera of the fungi imperfecti as optimal organisms for the degradation of corn, soy, and SO2 containing soy wheys respectively. Criteria for selection included rapid growth, ease of removal from solution by coarse filtration, and BOD reduction capabilities. Optimal growth for all three wastes included: (1) pH between 3.2 and 3.5; and (2) a temperature of 30C. Addition of both nitrogen and phosphorus was necessary for the corn wastes, and pH in all wastes was adjusted with sulfuric acid. Initial studies were done in 125 ml flasks containing nonsterile corn or soy wastes. After selection of optimal organisms for each waste, final studies utilized reactors of 20 liters in volume. 24 hours incubation time was sufficient to reduce corn waste BOD from 1600mg/1 to 25mg/1, while the reduction of soy waste BOD from 6200 mg/l to 125 mg/l required 36 hours. Overall mycelial yields were approximately 50 to 60 g of dry mycelium per 100 g COD utilized. The protein content of corn waste mycelium was 45% and the palatability to weanling rats was 90%. No toxicity was evident after three weeks, and the growth response was similar to that obtained with a standard casein diet. Economic analysis revealed that soy waste mycelium would provide a profit margin, while treatment of corn wastes would cause a slight loss. (Lowry-Texas)
W71-11365

CURRENT PRACTICE IN SEAFOODS PROCESSING WASTE TREATMENT,
Oregon State Univ., Corvallis.
Michael R. Soderquist, Kenneth J. Williamson, Guy I. Blanton, Jr., Donald C. Phillips, and Duncan K. Law.
Available from the National Technical Information Service as PB-202 232, $3.00 in paper copy. Water Pollution Control Research Series, Apr 1970. 118 p, 18 fig, 74 tab, 258 ref. EPA Program 12060 ECF 04/70.

Descriptors: *Industrial wastes, *Fish, Canneries, Fish farming, Commercial fishing, Flotation, Screens, Incineration, Landfills, Water quality control, *Waste water treatment.
Identifiers: *Seafood, Evisceration, Deep sea disposal, Suspended solids.

The various aspects of the seafood processing industry are discussed, including geographic locations of individual species, major uses, types of wastes produced, and associated waste disposal problems. Wastes are generally discharged directly into open water or estuaries. Also, most processing plants are located in relatively remote areas where the sea water has much less competition for its assimilative capacity which, in conjunction with greater dilution and mixing, has kept the problem from attaining crisis proportions. Seafoods waste waters are readily biodegradable and present few toxicity problems. The only impediment to the advancement of refined seafoods waste treatment has been the traditionally narrow profit margin of the industry. Therefore, vital elements of any new waste treatment schemes must first of all include federal or state financial assistance, and secondly, cooperation between kindred industries. At the present time, by-product utilization programs are being explored, along with disposal methods. Basic needs include a waste water characterization survey, waste water flow reduction, technical and economic evaluation of flotation and screening for on-site solids removals, investigation of the effects of seafood wastes on the aquatic environment, and determination of the economics of various solid waste utilization techniques and markets available. (Lowry-Texas)
W71-11366

LIMESTONE TREATMENT OF RINSE WATERS FROM HYDROCHLORIC ACID PICKLING OF STEEL.
Armco Steel Corp., Middletown, Ohio.

Copy available from GPO, Sup doc, Wash, D.C., $1.50; from NTIS as PB-202 233. Water Pollution Control Research Series, Feb 1971. 48 p, 4 fig, 6 tab, 10 ref. EPA Program 12010 DUL 02/71.

Descriptors: *Acidic water, *Neutralization, Limestones, Iron, Chemical precipitation, Temperature, Aeration, Flocculation, Sludge, Filtration, Dewatering, Industrial wastes, *Waste water treatment.
Identifiers: *Sludge recirculation, Clarification, *Limestone treatment, *Steel wastes.

A process was developed at bench scale by scientists of Armco Steel Corporation to treat acid rinse waters. The corporation's Middletown, Ohio plant contains two hydrochloric acid picklers which discharge 1500 gpm of such acid wastes which are then neutralized with limestone, aerated, and provided with sludge recirculation. After neutralization with the limestone, the aeration and sludge recirculation oxidize ferrous iron and form soluble calcium chloride. Following the bench scale work, pilot studies were performed which indicated a 25% excess of limestone was normally required, sludge recirculation was indeed beneficial and temperatures in excess of 120F led to higher sludge filtration rates and system capacities. Lower temperature operation required larger limestone excesses, higher aeration rates, higher sludge recirculation rates, and limestone of smaller particle sizes. 100% neutralization of the free acid and over 99% removal of iron was achieved in the full scale system using a 50% excess of limestone. Sludge produced was dense and easily filtered. Gamefish populations were maintained in the treated effluent despite the fact that influent temperatures as low as 59F were recorded. Capital costs for a 1500 gpm acid rinse water treatment facility were reported as $1,360,000, while operational costs averaged 24 cents/1000 gal or 4.38 cents/ton of steel pickled. (Lowry0Texas)
W71-11368

SECONDARY TREATMENT OF POTATO PROCESSING WASTES,
Federal Water Pollution Control Administration, Corvallis, Oreg. Pacific Northwest Water Lab.
Kenneth A. Dostal.
Copy available from GPO, Sup Doc, Wash DC, $0.65; Water Pollution Control Research Series, Jul 1969. 58 p, 10 fig, 10 tab, 14 ref. EPA Program 12060--07/69.

Descriptors: *Potatoes, *Pilot plants, *Lagoons, *Sewage treatment, Aerobic conditions, Anaerobic conditions, Biochemical oxygen demand, Hydrogen ion concentration, Temperature, Centrifugation, Screens, Nutrients, Foaming, Odors, Aeration, Industrial wastes, *Waste water treatment.
Identifiers: Suspended solids, *Potato processing wastes.

Annual U.S. potato production has risen from less than 10 million tons in 1951 to more than 15 million tons in 1966. From 1955 through 1966, annual production of frozen speciality products rose from 129 million lbs to 1460 million lbs. This phenomenal growth has produced increasing effluent problems. A pilot scale study was conducted from October 1966 through June 1968 on three lagoons. Several configurations were experimented with, but the two selected for comparison were: (1) a strictly aerobic lagoon having a 10 hp aerator; and (2) a series anaerobic-aerobic lagoon system with the aerobic lagoon, having a 5 hp aerator. All three ponds were approximately 40 ft x 40 ft x 10 ft deep. The anaerobic pond was covered with 3 inch thick styrofoam pads to control odors and prevent unnecessary heat loss. It was determined that primary clarification and either the aerobic lagoon or the anaerobic-aerobic lagoon series could achieve in excess of 90% BOD removals from the potato wastes. The BOD reduction across the ponds was adequately modeled using available models, and sufficient data was obtained to establish values for the necessary constants. No chemical additions for either nutrient balance of pH control were required, but use of a secondary clarifier for suspended solids removal was recommended. (Lowry-Texas)
W71-11369

ANAEROBIC-AEROBIC LAGOON TREATMENT FOR VEGETABLE TANNING WASTES,
Virginia Univ., Charlottesville.
Clinton E. Parker.
Copy available from GPO Sup Doc, Wash, D. C., $1.00; from NTIS as PB-202 235. Water Pollution Control Research Series, No. 12020 DIK 12/70, 84

p, 23 fig, 29 tab, 25 ref. EPA Program 12020 DIK 12/70, Grant WPD-199-01-67.

Descriptors: *Industrial wastes, *Oxidation lagoons, Color, Chemical oxygen demand, Biochemical oxygen demand, Organic loading, Aeration, Mixing, *Aerobic conditions, *Anaerobic conditions, *Waste water treatment, Virginia.
Identifiers: *Tannery waste water, *Tannins.

A field demonstration lagoon, operated at Virginia Oak Tannery, Inc., was subjected to five operational phases designed to cause the system to go from aerobic conditions to aerobic-anaerobic. Influent consisted of spent vegetable tannins mixed with batepool and soak waste waters, with an overall BOD5 of approximately 1000 mg/l. A 92% efficiency (in terms of BOD5 reduction) was obtained under aerobic conditions at a loading of 4.5 No. BOD/1000 ft cu/day, while an 81% efficiency was obtained under aerobic-anaerobic conditions at a BOD5 loading of 17.3 lbs BOD/1000 ft cu/day/B.hp. At this loading, soluble BOD5 and soluble COD removal efficiencies were recorded as 81 and 58% respectively. Separate laboratory evaluations revealed that 60% of the COD of spent vegetable tannins was not biodegradable. Modification of the generally accepted substrate growth interaction relationship was necessary to account for the non-degradable fraction of the COD. A completely mixed aeration unit receiving both dilute and concentrated tannins was used and the detention time varied to provide data for the computation of yield co-efficients, endogenous respiration rate, and specific growth. Although the system functioned well in biodegradable organics removal, color was not removed. Since color removal is the major concern with tannins, then color removal will dictate the optimal process for treating of tannins. (Lowry-Texas)
W71-11370

EVALUATION OF STORM STANDBY TANKS-COLUMBUS, OHIO,
Dodson, Kinney and Lindblom, Columbus, Ohio.
C. T. Lindblom.
Copy available from GPO Sup Doc, Wash, D. C., $1.50; from NTIS as PB-202 236. Water Pollution Control Research Series, March 1971, 126 p, 51 fig, 4 tab. EPA Program 11020 FAL 03/71.

Descriptors: *Storm runoff, *Storm drains, *Settling basins, Sedimentation, Sludge, Monitoring, Sampling, Analytical techniques, Dissolved oxygen, Automatic controls, Biochemical oxygen demand, Water quality control, Waste water treatment, Urbanization, Ohio.
Identifiers: *Combined sewers, Suspended solids, Settleable solids, *Columbus (Ohio).

Three tanks were constructed to provide sedimentation time for combined sewer overflows of the Columbus, Ohio sewerage system. The tanks were later modified to facilitate the handling of sludge. Detention time for the tanks at the estimated 1960 flow of 84 mgd was 22 minutes. Analysis of the tanks was undertaken to determine whether or not they accomplished sufficient reduction of the pollutional load to the stream to justify expansion of the tank capacity. A composite sampling procedure was developed, and the following tests were made or computed for each sample obtained: (1) total solids; (2) total volatile solids; (3) total fixed solids; (4) total suspended solids; (5) total suspended volatile solids; (6) total suspended fixed solids; (7) settleable solids; (8) ether solubles; (9) BOD 5; and (10) coliforms (MPN). The data obtained revealed that little or no reduction in coliform numbers was accomplished by the tanks. For average waste water, 15 to 40% reductions in suspended solids and 20 to 80% reductions in settleable solids were obtained in from 20 to 180 minutes, while BOD concentration reductions ranged from 15 to 35% over the same detention times. Dissolved oxygen concentrations increased from 8 to 200% depending upon influent concentrations. Although the tanks were shown to remove much material, these removals occurred at a time when stream assimilative capacity was highest, therefore, additional tanks could probably not be justified economically. (Lowry-Texas)
W71-11371

NEW AND ULTRA THIN MEMBRANES FOR MUNICIPAL WASTE WATER TREATMENT BY REVERSE OSMOSIS,
North Star Research and Development Inst., Minneapolis, Minn.
L. T. Rozelle, E. M. Scattergood, B. R. Nelson, and J. E. Cadotte.
Copy available from GPO Sup Doc, Wash, D. C., $0.70; from NTIS as PB-202 237. Water Pollution Control Research Series, October 1970, 40 p, 9 fig, 10 tab, 11 ref. EPA Program 17020 EFA 10/70.

Descriptors: *Reverse osmosis, *Semipermeable membranes, Permeability, Separation techniques, Economic feasibility, Technical feasibility, *Municipal wastes, Nitrates, Ammonia, Phosphates, *Membranes, *Waste water treatment, Osmosis.
Identifiers: *Ultrathin membranes, *Polysaccharide derivatives, Flux, Rejection, Cellulose acetate.

44 various polysaccharide mixed esters and ethers were tested on microporous supporting films for improved reverse osmosis treatment of municipal waste waters. Cellulose methyl sulfonate O-Propyl sulfonic acid (CMSOPSA) and cellulose acetate O-Propyl sulfonic acid (CAOPSA), at thicknesses between 250 and 5000 angstroms, exhibited water flux in excess of 40 gfd. The CMSOPSA membrane, at 370 angstroms thickness, rejected 96% TDS, 93% nitrates, 96% ammonia, 89% total dissolved organic carbon, and 99% phosphate. Long term (150 hours) testing of the CMSOPSA membrane resulted in an average water flux of 34 to 36 gfd over the last 100 hours, with 93% rejection for TDS, 94% for ammonia, and 83% for total organic carbon. A common enzyme presoak was efficient in restoring fouled membranes to a like-new condition. Similar rejections have been obtained with commercially available membranes, but at fluxes of less than 15 gfd. Preliminary hydrolysis degradation studies established the polymer membrane as superior to the cellulose acetate membrane in resisting degradation. Preliminary optimization studies also established that by: (1) rigorously controlling polymer preparation; (2) optimizing the casting procedures; (3) using a polysulfone support film; (4) optimizing the annealing conditions; and (5) making the membrane as thin as possible, it should be possible to produce a CMSOPSA membrane better than any presently available commercial membrane at about 40 cents/sq ft. (Lowry-Texas)
W71-11372

TREATMENT OF CITRUS PROCESSING WASTES,
Coca Cola Co., Orlando, Fla. Foods Div.
James B. Goodson, and Jack J. Smith.
Copy available from GPO Sup Doc, Wash, D. C., $2.75; PB-202 228. Water Pollution Control Research Series, October 1970, 37 fig, 26 tab, 9 ref. EPA Program 12060---10/70, Contract WPRD 38-01-67.

Descriptors: *Citrus fruits, *Industrial wastes, *Activated sludge, *Oxidation lagoons, Water hyacinths, Oxidation, Temperature, Organic loading, Kinetics, Nitrogen, Phosphorus, Design criteria, Sludge, Aeration, Sampling, Monitoring, Photosynthesis, Equalizing reservoirs, Chemical oxygen demand, Biochemical oxygen demand, *Waste water treatment, Florida.
Identifiers: *Citrus processing wastes, *Extended aeration, *Aerated lagoons, Sludge volume index, Coca Cola Company.

Two full scale treatment plants were studied to determine their efficacy in treating citrus processing wastes. The Leesburg plant, designed for an organic loading of 8,000 lbs BOD/day, function as an extended aeration activated sludge plant. It provided a 95.6% average daily BOD reduction even though its weekday loading averaged 52% above the design capacity. Problems encountered were mainly due to lack of both flow control devices and adequate sludge handling facilities. Sludge bulking was the cause of many solids going over the effluent weirs. Nitrogen and phosphorus removals averaged 70 to 90% respectively due mainly to sludge removal from the system. An oxidation pond following the extended aeration unit provided a buffer zone and reduced the BOD by 14% out of an average overall reduction of 94%. The second plant was operated as a series of aerated lagoons which provided an average of 91% BOD removals. Water hyacinths were used to remove dissolved organics and nutrients from the pond, and were easily harvested using existing equipment. Their possible use as a cattle supplement was explored. A variety of operational difficulties were experienced in both operations, suggesting that new plants should be operated for a year or so before meaningful data on true plant capability can be obtained. (Lowry-Texas)
W71-11373

PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTES--SECOND PROGRESS REPORT,
California Univ., Berkeley. Sanitary Engineering Research Lab.
Gordon L. Dugan, Clarence G. Golueke, William J. Oswald, and Charles E. Rixford.
California University, Sanitary Engineering Research Laboratory, Report No. 70-1, 165 p, 24 fig, 55 tab, 51 ref. US Public Health Service 5RO1 UI 00566-03.

Descriptors: *Farm wastes, *Poultry, Waste water treatment, Sedimentation, Oxidation lagoons, Anaerobic digestion, Algae, Sludge, Methane, Organic loading, Hydrogen ion concentration, Temperature, Centrifugation, Coagulation, Dewatering, *Cost analysis.
Identifiers: Volatile solids, Grit.

A 36-week study was initiated to provide information on the economics of treating animal wastes. Chickens were chosen, mainly for convenience sake, as the waste producers to be studied, and 113-twenty week old leghorn pullets were placed in cages. The treatment system used consisted of inclined troughs under the cages which were flushed with water from a flushing bucket, grit removal, sedimentation, an oxidation lagoon for the sedimentation tank supernatant, and an anaerobic digester for the solids. The systems approach was used, and system balances were performed for total solids, volatile solids, total unoxidized nitrogen and energy for the chickens, sedimentation tank, digester, and algae. All balances were performed from week 5 through week 36 except for the digester, where operation was terminated at week 24 and the solids dewatered, dried, and studied for possible further reuse. An economic analysis of an integrated system of 100,000 laying hens revealed a cost of approximately 2 cents/dozen eggs for a system based on the one tested. However, consideration of an extremely conservative algae harvesting rate of 12 tons/acre/year at a price of 5 cents/lb (dry weight) dropped the overall waste handling outlay to approximately 1 cent/dozen. On this basis, additional studies were recommended to aid in the implementation of treatment facilities for animal wastes as soon as possible. (Lowry-Texas)
W71-11375

DESIGN GUIDES FOR BIOLOGICAL WASTE WATER TREATMENT PROCESSES PERFORMANCE OF THE AERATED LAGOON PROCESS,
Texas Univ., Austin. Center for Research in Water Resources.
Hellmut R. Fleckseder, and Joseph F. Malina, Jr.
Technical Report EHE-70-22, CRWR 71, December 1970, 36 fig, 14 tab, 36 ref. FWQA Grant No WPRD 178-01-68.

Descriptors: *Oxidation lagoons, *Kinetics, Analytical techniques, Sampling, Aeration, Dissolved oxygen, Hydrogen ion concentration, Biochemical oxygen demand, Municipal wastes, Nitrogen, Filtration, Weir, *Waste water treatment, Texas, *Biological treatment.
Identifiers: *Aerated lagoons, Detention times, Suspended solids, Austin (Tex).

Plant scale tanks at the Williamson Creek Waste Water Treatment Plant with volumes ranging from 235,000 to 6900,000 gallons provided detention times of 10 hr to 8 days, and laboratory scale tanks at the Govalle Wastewater Treatment Plant, of 12 and 8 liters in volume respectively, provided detention times of 12, 8, and 6 hours. Input waste water to both systems contained 150 mg/l of total Biochemical Oxygen Demand, and 140 mg/l of suspended solids. Methods used for detection of food utilization by the microbes were oxygen uptake and substrate concentration. Three systems, including one tank, 2 tanks in series and 3 tanks in series were operated in parallel to determine the effect of staging upon the completeness of the biodegradation. It was determined that the effluent quality, both settled and filtered, from the three tank system, the two tank system, and the single tank system was the same for equal detention times. Therefore, staging had no detectable effect upon the process and was disregarded. Substrate removal rates (k) were obtained for the filterable fraction of the wastewater. Data representing daily average can be correlated by the steady-state model, whereas data obtained over one day should be correlated to a non-steady-state model. For the steady-state model and soluble BOD, k—8.1 (DAY/.., AND FOR THE NON—STEADY—STATE MODEL AND SOLUBLE TOC, k—6.2 day/1; both values hold at the first stage of the tanks. (Lowry-Texas)
W71-11376

SULFIDE PRODUCTION IN WASTE STABILIZATION PONDS,
Texas Univ., Austin. Center for Research in Water Resources.
Ernesto Espino de la O, and E. F. Gloyna.
Technical Report No. EHE-04-6802, CRWR-26, May 1967, 156 p, 50 fig, 33 tab, 75 ref. FWPCA Contract WP-00688-03.

Descriptors: *Oxidation ponds, *Hydrogen sulfide, *Sulfides, Algae, Organic loading, Biochemical oxygen demand, Oxidation-reduction potential, Dissolved oxygen, Odors, Corrosion, Oxidation, Photosynthesis, Analytical techniques, Spectroscopy, Colorimetry, Sampling, Methane, Carbon dioxide, Diffusion, *Waste water treatment.

Experiments were conducted on a 6 ft deep model facultative pond to determine the relationship between sulfide concentration in the pond and four operating parameters: (1) detention time, (2) concentration of sulfate ion in the influent, (3) BOD surface load, and (4) sulfate ion concentration in terms of surface load. All experiments were conducted under controlled environmental conditions, encompassing 7 different operational conditions. At constant detention time and constant BOD surface loading, a linear relationship existed between sulfide concentration in the pond and sulfate concentration in the influent. Increases in pond sulfide concentration from near zero to 1 and 2 mg/l, respectively, were accompanied by drops in the oxidation-reduction potential of 80 and 120 micron. Further increases in sulfide concentration affected the ORP to a much lesser extent. This phenomenon established ORP measurement as an indicator of potential odor troubles and/or pond system upset. Algae disappeared almost entirely when sulfide concentrations in the pond rose above 7.0 mg/l but BOD removal rates were not detectably diminsihed. Infrared spectroscopic analysis of gaseous emissions from the pond identified three of the component gases as methate, hydrogen sulfide, and carbon dioxide. Interference from moisture in the air prohibited further identification. (Lowry-Texas)
W71-11377

THE ADSORPTION AND REMOVAL OF PHOSPHATE BY FLYASH AND COAL CONTACT SYSTEMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
C. W. Randall, E. H. Rowell, and P. H. King.
Presented at 20th Southern Water Resources and Pollution Control Conference, University of North Carolina, Chapel Hill, April 2, 1970, 32 p, 10 fig, 3 tab, 25 ref. OWRR Project A-015-VA (4) and A-024-VA (2).

Descriptors: *Adsorption, *Coals, *Flyash, Phosphorous, Phosphates, Nutrients, Kinetics, Filtration, Alkalinity, Acidity, Hydrogen ion concentration, Temperature, Activated carbon, Waste water treatment.
Identifiers: *Contact time, *Elutriation.

Both batch and column type reactors were used to test the phosphate removal capacities of coal and flyash. Phosphate removal by coal was shown to be closely associated with the iron content of the coal, the mechanism of removal apparently a reaction with ferric ions. The removal was adequately described using the Freundlich isotherm. Polyphosphates were removed by coal as well or better than orthophosphates. Optimum phosphate sorption of 1.8 mg P/gram of coal occurred with high volate-C grade coal at a pH between 5 and 6. An acidic, low carbon, high alumina content flyash sorbed phosphorus more rapidly and to a greater extent than alkaline, high carbon, low alumina flyash with surface adsorption being considerably greater for the high alumina flyash. The extent of removal of phosphate from secondary effluent by flyash was shown to be a direct function of contact time. Distilled water elutriation reduced the sorption capacity of the flyash by as much as 77%. Although the phosphorus sorption capacity of both coal and flyash is considerably less than that of alumina, they can still be economically competitive due to their low cost. However, investigations must be made on a pilot or lab scale for each particular application before their suitability can be evaluated. (Lowry-Texas)
W71-11378

FIELD CROP IRRIGATION WITH OXIDATION POND EFFLUENT,
Mississippi Agricultural and Forestry Experiment Station, State College.
James B. Allen, and John C. McWhorter.
Available from the National Technical Information Service as PB-202 240, $3.00 in paper copy. American Society of Agricultural Engineers, Paper No. 71-246, 29 p, 8 fig, 10 tab, 12 ref. OWRR Project A-040-MISS (3).

Descriptors: *Water reuse, *Irrigation water, Crop response, Alfalfa, Wheat, Soybeans, Clovers, Corn (Field), Nutrients, Phosphates, Nitrogen, Oxidation lagoons, Municipal wastes, Water quality control, Coliforms, Biochemical oxygen demand, Storage, Eutrophication, Waste water treatment, Public health.
Identifiers: *Recreational waters.

An 18 month study was conducted to investigate the possibility of irrigating crops in Mississippi with oxidation pond effluent: Wheat, soy beans, sudax, alfalfa, sweet clover, and corn were irrigated with effluent from an oxidation pond treating only industrial wastes. No operation problems, such as odor, soil blinding, soil water logging, or reduction of apparent infiltration capacity were encountered. However, the available nutrients in the pond effluent were not sufficient in themselves to sustain high yields of any of the crops tested. High rainfall amounts and high groundwater table levels were blamed for the lack of response to irrigation, either by convention water or pond effluent. No build-up of nitrates plus ammonia nitrogen occurred during irrigation. Significantly larger nitrogen concentrations were detected in the ground water after fertilization. Although the high BOD, total and fecal coliform counts, and nutrient levels of effluents could be reduced by irrigation of cropland, winter storage facilities would have to be constructed in Mississippi to avoid winter kill of most cerals due to excess water. (Lowry-Texas)
W71-11379

DETERMINATION OF ORGANICS IN WATER,
Pittsburgh Univ., Pa. Graduate School of Public Health.
For primary bibliographic entry see Field 05A.
W71-11380

DIATOMITE FILTRATION-AN OLD CONCEPT GAINS NEW ACCEPTANCE,
Johns-Manville Co. Ltd., Toronto (Ontario). Celite Products Div.
Harris G. Walton.
Water and Pollution Control, Vol 108, No. 10, October, 1970, p 20-22, 4 fig.

Descriptors: *Diatomaceous earth, *Filtration, *Water purification, Separation techniques, Industrial wastes, *Waste water treatment, Sludge, Dewatering, Vacuum drying, Pressure.
Identifiers: *Biological growth, *Suspended solids.

Diatomite filtration has been growing in popularity in Canada over the last fifteen years. Over 2,000 potable and industrial installations have been constructed over the last few years. However, much of the progress of acceptance of diatomite filter aids has been impeded by older methods of filtration using cumbersome filters, which lacked the quick and easy operation built into the newer models. Previous installations also were blamed for fouling and plugging when the biological pretreatment system failed. Not only was the trouble not the fault of the filters, but the filters actually acted as a safety check valve. Some of the more recent installations have actually installed diatomite filters for just such a purpose. Diatomite filters have the versatility to handle wide ranges of load variations, and they also possess an important advantage over other filters by allowing the operator to dispose of waste solids in a dry form. Work is currently underway to study the feasibility of filters in several new applications, including the dewatering of alum and hydroxide sludges. (Lowry-Texas)
W71-11382

NEW TERTIARY TREATMENT PLANT TO COMBAT EUTROPHICATION,
Miles Overend.
Water and Pollution Control, Vol 108, No. 10, p 30-32.

Descriptors: *Tertiary treatment, *Water quality control, Nutrients, Nitrogen, Phosphates, Domestic wastes, Waste water treatment, Coagulation, Flocculation, Sedimentation, Sludge, Aeration, Digestion, Eutrophication, Lakes, *Treatment facilities.
Identifiers: *Penticton (Canada), Lake Skaha, Lake Okanagan.

Penticton, British Columbia, Canada, is situated between Lake Skaha and Lake Okanagan. Concern about the water quality of both lakes has arisen for two reasons: (1) the economy of the area is based mainly on tourism; and (2) annual precipitation is only 12 inches and water is scarce in the area. Irrigation of the surrounding arid lands was attempted but the soil was found to be unsuitable. The only other alternative was addition of tertiary treatment to the existing facilities. Problems were also present due to the 200% increase on the organic and volumetric loadings to the plant during the summer season. Phosphate removal facilities were of top priority, but provision was made for the addition of nitrogen removal pilot scale investigations, and hook-up to the plant mainstream should a feasible process be discovered. Two flocculation and sedimentation tanks, a chemical sludge thickener, a chemical feed building, and chemical sludge beds were constructed for phosphate removal at a cost of $195,000. A flow-through cycle for the influent is described. Authorities are convinced that the next step is treatment of the

lakewater itself, but nutrient removal from the domestic wastes is a beginning. (Lowry-Texas)
W71-11383

REMOVAL OF WASTEWATER NUTRIENTS IN A COMPACT PLANT.
Dravo Corp., Pittsburgh, Pa.

Public Works, Vol 102, No. 1, January 1971, p 72-73, 3 fig.

Descriptors: *Activated sludge, *Chemical precipitation, *Dentrification, Nitrates, Phosphates, *Nutrients, Flocculation, Sedimentation, Activated carbon, Sand, Filtration, Temperature, Biochemical oxygen demand, Chlorination, *Waste water treatment, Treatment facilities.
Identifiers: *Suspended solids, Detention time, Backwashing.

The Indian Lake Sewage treatment plant consists of two factory built biological treatment units followed by a polishing lagoon and a chlorine contact tank. The biological units were designed to operate either as extended aeration units or contact stabilization units with capacities of 95,000 gpd and 175,000 gpd respectively. Studies were conducted with the intention of demonstrating that both phosphates and nitrates could be removed simultaneously with filter effluent polishing in a compact treatment system. Jar tests were performed with lime, alum, sodium, aluminate, ferric sulfate, and various polymers for the precipitation of phosphates. Various points of addition were also tried, and the point of contact between the reaerated sludge and the sewage was chosen as optimal. 1 to 2 mm sand, 2 to 3 mm sand, and granular activated carbon were used as filter media in three separate filters. Test results showed the 2 to 3 mm sand to be best for both effluent polishing and denitrification. BOD removal averaged 99%, suspended solids removals averaged 98.5%, phosphorous average removal was 81.8%, and pilot column nitrogen removal tests showed an average reduction of 92.3%. The carbon supply for nitrification was methyl alcohol supplied at a ratio of 2.5 alcohol to nitrate as N. Ferric sulfate addition at 2:1 Fe:P was found to remove 80% of the phosphates or 3:1 Fe:P for 90% removals without damage to the activated sludge and without interferring with denitrification. (Lowry-Texas)
W71-11384

POLYELECTROLYTE CONDITIONING OF ALUM SLUDGES,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
Henry M. Bugg, Paul H. King, and Clifford W. Randall.
Journal of the American Water Works Association, Vol 62, No. 12, p 792-795, 6 fig, 1 tab, 6 ref. OWRR Project A-030-VA (1).

Descriptors: *Water treatment, *Sludge, Water pollution control, Dewatering, Zeta potential, Vacuum filtration, Mixing, Neutralization, Adsorption, Biochemical oxygen demand, Toxicity, Hydrogen ion concentration, Waste water treatment.
Identifiers: *Polyelectrolytes, *Chemical conditioning, *Alum sludges, Specific resistance, Chemical dosage, Alum, Jar tests, Seeding.

Water treatment plant wastes, once of little or no concern, have been recognized as another source of pollution of our nation's waterways. The major portion of these wastes is alum sludge, a sludge of poor drainability necessitating the use of some chemical conditioning agent to enable rapid dewatering of such sludges by either gravity drainage or vacuum filtration. Synthetic organic polymers were tested for this purpose. Primary variables investigated were system pH, solids concentration of the sludge, time of mixing, and the nature and dose of polyelectrolyte used. Two cationic (Nalco 605 and 610), two nonionic (Nalco 670 and 671), and three anionic (Nalco 673, 674, and 675) were chosen for the study. Specific resistance and Zeta potential of the sludges were monitored. All polyelectrolytes investigated improved the dewatering characteristics of the sludge, while anionic polymers were somewhat superior to nonionic polymers and significantly superior to cationic agents. The ability of the sludge to be more readily dewatered after conditioning was attributed to molecular bridging between the molecules. Electrostatic forces were apparently overwhelmed by the stronger chemical forces. Data also indicated a possibility of polymer overdose producing deleterious effects. Dosage should be calculated on a wt of polymer/wt of solids rather than a wt of polymer/volume of sludge basis. (Lowry-Texas)
W71-11385

UPFLOW FILTRATION USING THE IMMEDIUM FILTER,
Peacock Brothers Ltd., Montreal (Quebec).
B. Hutchinson.
Water and Pollution Control, Vol 108, No. 10, October, 1970, p 17-18, 4 fig, 1 tab, 2 ref.

Descriptors: *Filtration, *Water purification, Sands, Biochemical oxygen demand, Turbidity, Color, Flow rates, Iron, Manganese, Tertiary treatment, *Waste water treatment.
Identifiers: *Upflow, *Compression arches, Suspended solids, Backwashing.

Interest in improving conventional, downward flow, rapid, sand water filtration has led to several new developments in filtration. It has long been recognized that sand beds in downflow filters are size graded after backwashing in exactly the reverse order as that which would provide both optimum removals and optimum operational characteristics. Flow therefore should be introduced through the bottom, but in that case the bed would expand. Bitflow filters introducing the raw water to both the top and the bottom simultaneously, were an early attempt to prevent bed expansion. However, the effluent quality was dependent upon the poorest quality of filtration of the two filters, and the downflow filtration was again limiting. The grid-type immedium filter was developed using a steel grid to hold the bed in compression. These filters have been applied not only to water treatment, but to effluent treatment as well. The more obvious advantages of immedium upflow filtration have been determined as: (1) for a given filtration speed a better quality effluent is obtained; (2) with poor feeds, good removals can still be obtained without sacrificing the flow rate; (3) for a given rate of flow and clogging head, longer runs between backwashes are possible; (4) use of raw water for backwashing represents a direct savings; and (5) the system permits a smaller area of bed to be used and possibly a smaller number of filters. Work is continuing to determine optimum media size and composition of filter beds for various applications. Catalytic media for iron and manganese removal and dolomitic media for stabilization of water containing aggressive carbon dioxide are also being studied. (Lowry-Texas)
W71-11386

MEAT PACKING WASTES RESPOND TO MANY TREATMENT METHODS.

Environmental Science and Technology, Vol 5, No. 7, July 1971, p 590-592.

Descriptors: *Industrial wastes, *Farm wastes, Cattle, Sheep, Oxidation lagoons, Trickling filters, Flotation, Activated sludge, Sedimentation, Coagulation, Flocculation, Temperature, Anaerobic digestion, Cost analysis, *Waste water treatment.
Identifiers: *Slaughterhouse wastes, Viscera, Hair, Blood, Oxidation lagoons, Rotating biological contactors.

137 million cows, pigs, and lambs were slaughtered in 1970. Waste products from a medium sized packing plant were shown to have a population equivalent of 100,000 people. A gallon of blood alone, with a BOD in excess of 150,000 ppm has the same oxygen demand as the daily wastes from 7 to 8 people. However, much of the blood, scrap, and grease produced is of sufficient economic value to justify recovery. Nearly all packing plants have a catch basin or holding tank providing at least a 20 min. detention time for recovery of scraps and grease. Further treatment methods have been well documented, and include lagoon systems, air flotation, activated sludge, trickling filters, rotating biological contactors, oxidation ditches, and anaerobic contactors followed by polishing lagoons. Several construction options are also available, depending upon the situation; (1) plants may construct their own, in-house treatment facilities; (2) plant effluent may be discharged directly to a municipal sewer in cases where the municipal plant has sufficient capacity; and (3) the municipality may build a new treatment plant for the slaughterhouse wastes, operate it, and charge the slaughterhouse for the services. An example of the third alternative is presented. (Lowry—Texas)
W71-11387

HANDLING DYE WASTES IN A MUNICIPAL PLANT,
Tarboro Water Pollution Control Plant, N.C.
Ronald Williamson.
Public Works, Vol 102, No. 1, January 1970, p 58-59, 1 fig, 2 tab.

Descriptors: *Waste water treatment, *Domestic wastes, *Industrial wastes, Trickling filters, Rocks, Sedimentation, Biochemical oxygen demand, Chlorination, Chemical precipitation, Flocculation, Coagulation, Cost analysis, North Carolina, Treatment facilities.
Identifiers: *Dye wastes, Suspended solids, Tarboro.

The Water Pollution Control Plant at Tarboro, North Carolina was designed to handle 1.3 mgd of municipal wastes, employing sedimentation, biochemical oxidation by trickling filter, and chlorination. Commissioned in 1960, the plant functioned well even without the chlorine facilities until the area became a center for fabric dyeing. By late 1969, the industry contributed 295,000 gpd of dye waste, or 40% of the total influent. Reductions of both BOD and suspended solids had dropped from the 80% range to the 60% range. In February of 1970, chlorination of the effluent at 20 mg/l was instituted as a corrective measure. BOD reductions obtained ranged from 85 to 95%. In June 1970, flocculation tests were begun, using alum as the flocculant. BOD reduction through the plant was 90% before chlorination, and 97% after chlorination. Suspended solids removals averaged in excess of 97%. Once the fact that a high degree of treatment could be achieved was established, a cost analysis was made. Costs for alum flocculation plus chlorination ranged from $50-75 per day. Chlorination alone amounted to $10 to $15 per day but did not reduce suspended solids. Alum flocculation, on the other hand, did provide acceptable removals both of BOD and suspended solids at a cost of $35 to $60 per day when used alone. Further cost comparisons using polyelectrolyte coagulant aids are continuing. (Lowry-Texas)
W71-11388

PLASTIC PACKED TRICKLING FILTERS MINIMIZES CHANCE OF PLUGGING.

Water and Pollution Control, Vol 108, No. 10, October, 1970, p 25-26, 4 fig.

Descriptors: *Trickling filters, *Plastics, *Rocks, Design criteria, Organic loading, Ponding, Sludge, Sedimentation, Biochemical oxygen demand, Activated sludge, Oxidation lagoons, Waste water treatment, *Filtration.
Identifiers: *Plastic filter media, *Plugging, Bulking.

Trickling filters, in common use some thirty years ago, have been largely abandoned in favor of the

activated sludge process. Primary reasons for this abandonment resulted, not from the theory or the actual mechanisms involved, but from the fact that trickling filters were made of rocks. Surface area to volume of small rocks could never be accurately measured, hence no actual design optimizations were possible. Also, it was impossible to control the size of the open spaces for both air and liquid passage, resulting in limitations to the strength and character of the waste treated and causing frequent plugging. Finally, a massive support system was needed, limiting the actual filter depth. Plastic trickling filter media incorporates a special design of high void space, permitting free air passage, minimizing plugging, and allowing operation at high organic loadings. Organisms which slough off of the uniform areas are easily settleable. BOD removal efficiencies have been shown to vary from 85% at 100 lb BOD/1000 cu ft/day to 45% at 400 lb BOD/1000 cu ft/day, making the filters particularly suitable for high strength wastes. Systems combining plastic filters with aerated lagoons for effluent polishing are being researched. (Lowry-Texas)
W71-11389

SURVEY OF DESALTING PROCESSES FOR USE IN WASTEWATER TREATMENT,
Oak Ridge National Lab., Tenn.
I. Spiewak.
Oak Ridge National Laboratory Publication ORNL-HUD-21UC-41-Health and Safety, 31 p, 10 fig, 2 tab, 19 ref. AEC-HUD Contract No. W-7405-eng-26.

Descriptors: *Desalination processes, *Water reuse, Separation techniques, Demineralization, Filtration, Biological treatment, Tertiary treatment, Activated carbon, Adsorption, Reverse osmosis, Electrodialysis, Distillation, Membranes, Brines, Organic matter, Nutrients, Sludge disposal, Temperature, Incineration, Water supply, Cost analysis, *Waste water treatment.
Identifiers: *Hyperfiltration.

A review of the major aspects of desalting technology was conducted and the more promising methods were reviewed. These mechanisms included electrodialysis, reverse osmosis, dynamic membrane hyperfiltration, and distillation. Nearly all of the processes lead to a product water of greater purity than that of most natural waters presently used for municipal supplied. These processes also produce a resultant concentrate which is very difficult to dispose of. Using a hypothetical city of one million population, these processes were used to formulate cost estimates for various systems alternating between complete recycle and no recycle. Use of present desalting techniques would increase the cost of sewage treatment by as much as 4 times. By incorporating water supply and waste water treatment, use of desalting techniques would only increase the total system cost by about 30%, from 19.3 cents/1000 gal for conventional supply and primary-secondary-tertiary-treatment to 24.7 to 26.0 cents/1000 gal for complete recycle of waste water using both membrane and distillation processes. As pollutional laws become increasingly stringent with regard both to organics and excessive nutrients, such a process becomes ever more attractive. (Lowry-Texas)
W71-11390

FILTER PRESS COSTS VERSUS LAND DEMAND,
Upper Thames Main Drainage Authority, (England). Walsall Works.
B. R. Edmondson.
Surveyor, Vol CXXXVI, No. 4075, 17 July 1970.

Descriptors: *Sludge disposal, *Drying, Solid wastes, Cost comparisons, Lagoons, Drainage engineering, Filtration, Beds, Land, Dewatering, Solids, Sedimentation, Sewage treatment, Pollution abatement, Costs, Oxidation lagoons, Waste water treatment.
Identifiers: *Filter presses, Cake, Plate, Press.

Sludge drying is a low cost means of sewage treatment which has been very popular especially since it only requires enough land to allow for drying and lagoons to receive what the beds cannot handle. Walsall Corporation and later the Upper Thame Drainage Authority, which assumed the corporation's responsibilities for sewerage, was using the sludge drying process when difficulties arose. The sludge drying area was fully loaded, other sites were hard to find, land costs had risen steeply, and a motorway was routed through the area in which the lagoons which held the excess sludge were situated. In addition, sludge accumulation during the winter months, annual increases in stockpiles of dried sludge, danger of increases in pollution due to smell nuisance, and fire hazards were problems. In 1969, the filter press method of drying was installed. The mechanical drying method was more expensive than natural drying, but it also had advantages. Tests were made to discover the most practical press size to use in the new system, and it was shown that a small 51 in2 plate was in general better than that of a press with a larger plate. The cake thus produced has a moisture content some 4-5% lower than that produced by the other press. The cost per ton of dried solids from the drying beds was 57-7 shillings per ton, while the press plant costs were 149-9 shillings per ton of dry solids. Although the filter press method may seem more expensive, the expenses seem negligible when compared to the reduced need for air pollution control of smell and smoke, improvements of the aesthetics of the area and reduction of the demand for land. (Atkins-Texas)
W71-11391

FACTORS AFFECTING THE USE OF PURIFIED SEWAGE EFFLUENTS FOR COOLING PURPOSES,
Johannesburg Municipality (South Africa).
D. W. Osborn.
Water Pollution Control, Vol 69, No. 4, p 456-464, 5 fig, 1 tab, 1 ref.

Descriptors: *Cooling water, *Electric power plants, *Water reuse, Cooling towers, Dams, Algae, Hydrogen ion concentration, Temperature, Alkalinity, Nitrification, *Corrosion, Carbon dioxide, Solubility, *Phosphates, Chemical precipitation, Filtration, Ammonia, Water purification, Waste water treatment.
Identifiers: *Nitric acid, *Langelier Index.

One of the more important problems involved in using purified sewage effluent as cooling water for power stations has been the oxidation of ammonia to nitric acid. Serious corrosion damage to concrete and metal fixtures has been the result in several instances. In addition to corrosion, phosphate precipitation from low alkalinity, low pH waters has also caused many problems in lines and pumps. Therefore, construction of the new Orlando power station included a large dam. The 65 acre area, 180 x 10 6 gal. volume formed by the dam served as a maturation pond in which the ammonia present in the water is slowly distilled off and not converted to nitric acid. The pond is maintained at 24C the year round, so that ammonia and BOD removals can continue during both summer and winter conditions. During this detention period, the algae also raise the pH levels of the water to the point where phosphate is precipitated out before it can foul the pipes and valves of the cooling towers. The operational experience needed to correct these problems was gained over a 30 year period. Successful utilization of waste water effluents to augment scarce water supplies has long been a way of life in Johannesburg, and the experience gained there has contributed much to the new technology of water re-use. (Lowry-Texas)
W71-11393

GROWN-UP COMPANY TOWN COPES WITH POLLUTION PROBLEMS,
Ware Shoals, S. C.
F. C. McLane.
Public Works, Vol 101, No. 9, September 1970, p 99-100.

Descriptors: *Cost analysis, *Economics, *Government supports, Local government, *Treatment facilities, Water supply, Industrial wastes, Sewage disposal, Lagoons, Grants, Financing, Operating costs, Construction costs, Waste water treatment, Design criteria, Specifications, South Carolina.
Identifiers: Ware Shoals (So Car), Riegel Textile Corp.

The people of Ware Shoals, South Carolina were faced with the double task of dealing with pollution and organizing a new city government in 1967, when it was incorporated. Preliminary engineering plans were made and a bond issue of $800,000 was voted. In 1968, Riegel Textile Corporation, the company which originally established the town and had provided many services before incorporation, offered the idea of building a joint industrial/domestic lagoon for the disposal of domestic sewage and industrial wastes. Ware Shoals will build, own, and operate the facility, while Riegel has contracted to pay approximately 90% of the construction and operating costs. This proposal was advantageous to the city in many ways: (1) the site offered was the only practical one for the location of the largest lagoon in the proposed system, thereby saving a switch to another type of system, (2) the town saved $60,000 in construction costs. Riegel also benefitted in that it would save $300,000 in costs due to town's being able to obtain Federal Water Pollution Control grant moines. Although the town had a water system of sorts, it was bery inadequate due to age, corrosion, and small pipes. There was no treatment of domestic sewage at all, and industrial waste was emptied into the Saluda River after only partial treatment. Plans call for extension of water lines, repair and replacement of other lines, extension of the sewer system to almost all areas of town, and construction of two lagoons on one side of town and the large combined lagoon on the River. (Adkins-Texas)
W71-11394

DESIGN AND OPERATING EXPERIENCES USING DIFFUSED AERATION FOR SLUDGE DIGESTION,
Gilbert Associates, Inc., Reading, Pa.
Lewis E. Ritter.
Journal Water Pollution Control Federation, Vol 42, No. 10, Oct. 1970, p 1782-1791, 6 fig, 3 tab.

Descriptors: *Treatment facilities, Cost comparisons, *Anaerobic conditions, *Aerobic conditions, *Digestion, Aeration, Sludge, Hydrogen ion concentration, Temperature, Oxidation-reduction potential, Odors, Lime, Coagulation, Dewatering, Methane, Electric power costs, Cost analysis, Waste water treatment, Costs.

Three sewage treatment plants, having modifications of the activated sludge process and aerobic sludge digestion with diffused aeration were studied to determine the actual performance and cost figures of such systems. Two of the systems received little or no industrial waste, while industrial wastes contributed nearly 70% of the influent to the third plant. The plants population equivalents served ranged from 7,500 for the largest to 3,650 for the smallest. All three plants were loaded at or near their design capacity, and all produced a stable, readily dewaterable sludge, useful for soil conditioning and fertilizing. Aerobic digestion, although not producing as great a reduction of volatile solids as did anaerobic processes, was neither inhibited as easily nor was it plagued by foul odor problems. Present design criteria of 3.0 to 5.0 ft3/population equivalent of digester volume and 1.0 ft2/population equivalent of drying bed area were shown to be sufficient within the limitations of prevailing weather conditions, etc. Aeration rates in actual practice have been found to vary between 25 and 30 cfm/1000 ft3, slightly above the recommended 20 cfm/1000 ft3. Average power costs were computed and found to be $.218/yr/lb of BOD received/day, or $.37/yr/population. Below population of 8,000 operating costs for aerobic digestion were less. At 8,000 or above, the situation reversed. (Lowry-Texas)
W71-11395

MONITORING FOR LAS IN NORTHERN CALIFORNIA SLUDGE DIGESTERS,
California Univ., Berkeley. Sanitary Engineering Research Lab.
S. A. Klein.
Sanitary Engineering Research Laboratory Report No. 69-9, 36 p, 2 fig, 4 tab, 12 ref.

Descriptors: *Anaerobic digestion, *Detergents, *Alkyl benzenesulfonates, *Linear alkylate sulfonates, Biodegradation, Anaerobic conditions, Adsorption, Sampling, Monitoring, Sands, California, Waste water treatment, Sludge digestion, Digestion.
Identifiers: *Digester failure.

Accusations have been widespread that anionic detergents are often times responsible for digester failure. A number of digesters were carefully monitored and analyzed to determine whether or not LAS did cause digester upset. Work performed in England established the 1.0% (dry solids basis) level as being the critical level. Methylene Blue Active Substances (MBAS) levels in California digesters were found to be 0.5% or less in the raw sludge. Circulating digester sludge was found to contain 200 to 400 mg/l (1.0 to 1.5% dry solids), also below the reported retardation level of 600 to 900 mg/l for digester sludge. Bottom sludge samples yielded an average of 1000 mg/l MBAS, only 0.5% MBAS on a dry solids basis due to the greater total solids concentration. Therefore, the effective parameter was taken to be reduced digester capacity and not LAS concentration. Although the cause of the unusual number of digester upsets during 1963-1967 remains unknown, trouble free performance since that time supplemented by the data obtained here essentially preclude LAS concentrations as the causative agent. (Lowry-Texas)
W71-11397

THE EFFECTIVENESS OF A CONTACT FILTER FOR THE REMOVAL OF IRON FROM GROUND WATER,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05F.
W71-11399

WATER QUALITY MEASUREMENTS BY SODIUM ION ANALYSIS FOR BOILER FEEDWATER APPLICATIONS,
Leeds and Northrup Co., North Wales, Pa. Analytical Equipment Div.
For primary bibliographic entry see Field 05A.
W71-11482

A VISUAL DEMONSTRATION OF THE BENEFICIAL EFFECTS OF SEWAGE TREATMENT FOR PHOSPHATE REMOVAL ON PARTICULATE MATTER PRODUCTION IN WATERS OF LAKES ERIE AND ONTARIO,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.; and Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 05C.
W71-11507

FILTERABILITY OF STREPTOCOCCAL L-FORMS,
North Carolina Univ., Chapel Hill. Dept. of Bacteriology and Immunology.
Priscilla B. Wyrick, and Harry Gooder.
Journal of Bacteriology, Vol 105, No 1, p 284-290, January 1971. 2 fig, 6 tab, 28 ref.

Descriptors: *Filtration, *Streptococcus, Bacteria, Analytical techniques, Cultures, Isolation, Waste water treatment, Water treatment.
Identifiers: Streptococcus faecium.

The filterability of the broth-grown stable L-form derived from Streptococcus faecium F24 was tested by filtration under the influence of varying amounts of applied pressure. A decrease in the pore size of the filter resulted in a corresponding decrease in viable count, but no major effect was noted due to the different pressures applied. Serial filtration of a deoxyribonuclease-treated L-form culture in the mid-logarithmic phase of growth resulted in recovery of viable L-forms from the 0.45 micron filtrate but not from the 0.22 micron filtrate. It is possible that disruption of the L-form bodies with release of small viable elements had occurred. Protoplasts, diluted in an osmotic stabilizer, were filtered similarly; L-forms could be grown from the filtrate passing through the filters of 0.45 micron or greater. Filtration of the parent streptococci gave rise to streptococcal colonies from the 1.2 micron filtrate only. (McCann-Battelle)
W71-11539

CERTIFICATION OF FACILITIES FOR TAX AMORTIZATION PURPOSES.

Administrative Procedures Manual, California Water Resources Control Board, Sacramento, Calif, p 45-47, G-1 thru G-2 (1970). 5 p, append.

Descriptors: *California, *Treatment facilities, *Costs, *Amortization, Water pollution, Water pollution control, Waste treatment, Industrial wastes, Pollution abatement, Water pollution sources, Water quality, Water quality control, Standards, Waste disposal, Legislation, Legal aspects, Profit, Government finance, Estimated benefits, Taxes, Administrative agencies, Adoption of practices.

Applications for certification of waste treatment facilities for tax amortization purposes shall be submitted to the Secretary of the Interior. They shall contain the following information: (1) a description of the property, including necessary engineering drawings and a description of the function and operation of the facility; (2) a site map of the facility's location; (3) a description of the industrial operation that the facility will service; (4) a description of the quantitative and qualitative effect of the facility in removing wastes; and (5) the amount of profits to be derived through recovery of wastes in operating the facility. Pursuant to the Water Code, a waste discharge report must be submitted with the application. Administrative procedures for handling applications are established for the regional staff and the state board. Certification will be recommended if: (1) the facility is in conformity with state plans, applicable water pollution control programs, and water quality standards established pursuant to the Federal Water Pollution Control Act and (2) there is a reasonable assurance that the facility is in compliance with applicable waste discharge requirements. Other provisions establish time schedules for processing applications. (Gallagher-Florida)
W71-11558

WASTE DISCHARGE PERMIT AND REPORTING REQUIREMENTS.
Montana State Board of Health, Helena.

Regulation No 52.40-10, Montana State Bd of Health, Helena, Mont, 4 p.

Descriptors: *Montana, *Water pollution control, *Sewage disposal, *Administrative agencies, Pollution abatement, Permits, Regulation, Industrial wastes, State governments, Legal aspects, Water use, Treatment facilities, Water pollution, Water quality control, Administrative decisions, Adoption of practices.

This regulation pertains to the submission of treatment facility reports, plans, and specifications and the issuance of permits for the discharge of sewage and other wastes into state waters. It is herein declared unlawful to: (1) cause water pollution or to place any wastes in a location where water pollution may result; or (2) conduct, without a current permit, certain enumerated activities such as operating a disposal system which discharges into state waters. The Board of Health may issue or revoke orders for pollution abatement and issue, revoke, or deny permits for waste discharge. Permits for new discharges shall be issued when a review indicates that pollution will not occur. Permits for existing discharges will be issued if no water pollution exists. If a permit violation causes damage to a water use revocation may be ordered immediately without a hearing. Reports, plans, and specifications shall be submitted for: (1) new or existing disposal systems and treatment works, (2) extensions to factories for operations which will cause increased waste discharge, and (3) new outlets for sewage discharge. The content of such reports is herein detailed. (Shelnut-Florida)
W71-11585

THE MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM.
Muskegon County Board of Supervisor, Mich.

Bauer Engineering, Inc., Design Consultant report, Chicago, Illinois, July 1971, 16 p. 7 fig, 2 map, 2 dwg, 2 chart.

Descriptors: *Waste water treatment, *Management, Water quality control, *Municipal wastes, *Industrial wastes, *Water reuse, Michigan, Urban areas, Soils, Water purification, Irrigation efficiency, *Sewage treatment.
Identifiers: *Muskegon County (Mich), *Wastewater management system.

The steps involved in the Muskegon County wastewater management system are described in detail. Wastewater from the urban areas of Muskegon County is piped from the shoreline to an inland location where it receives the equivalent of conventional secondary treatment. The water is stored and disinfected, and then is spray irrigated on a variety of crops. The water is purified as it passes through the soil. It is collected in an underdrainage system, which is constantly monitored to maintain water quality standards. The water is discharged to the surface waters of the County to augment low flow. A closed system, total management approach is maintained. The wastewater management system is further discussed in terms of its relation to existing conditions in the County and its future impact in the Muskegon County area. (Strachan-Chicago)
W71-11601

LINED LAGOONS PREVENT POLLUTION IN PARK AREA.

Public Works, Vol 102, No 7, p 79. July 1971, 2 photo.

Descriptors: *Oxidation lagoons, *Linings, *Waste water disposal, *Water pollution control, Oregon, Parks.
Identifiers: *Unipqua National Forest.

The construction of an oxidation lagoon system near Diamond Lake in Oregon's Unipqua National Forest is discussed. Four ponds were constructed covering an area of about thirty acres and with a water depth of about three feet. These ponds can be operated in series or parallel. An auxiliary pond which was unlined was built to receive the final effluent, thus allowing for disposal by seepage and evaporation. The lining was 10-mil polyvinyl chloride, 70 1/2 feet wide and in lengths from 400 to 600 feet. There were twenty-eight sheets which were overlapped and sealed with a waterproof adhesive, resulting in an impervious lining for the wastewater lagoon. At the end of the test period the total water loss was only 5/8 inch, solely due to evaporation. (Strachan-Chicago)
W71-11613

DESIGN CRITERIA FOR SEWERAGE SYSTEMS.
Texas State Dept. of Health, Austin. Division of Waste water Technology and Surveillance.

1970. 44 p, 3 fig.

Descriptors: *Texas, *Design criteria, *Treatment facilities, *Sewage treatment, Regulation, Design, Standards, Treatment, Sludge treatment, Tertiary treatment, Waste treatment, Chlorination, Filtration, Sanitary engineering, Sewage disposal, Sewage effluents, Solids contact process, Trickling filter, Waste water treatment, Pumping stations, Piping systems, Safety factors, Technology, Legislation, Legal aspects.

Rules have been adopted by the Department of Health to insure clarity of all data essential for consideration of contemplated sewerage improvement projects, to establish the minimum standardized basic design criteria considered necessary to comply with effluent quality standards, and to provide facilities designed in accordance with good health engineering practices. Sewer lines shall be designed for the estimated future contributory population, plus adequate allowance for infiltration and institutional and industrial flows. In the selection of lift station sites consideration shall be given to accessibility, potential nuisance aspects, and remoteness from populated areas. Design specifications for lift stations are enumerated. Minimum parameters for waste water treatment facilities are prescribed. Design requirements are provided for: (1) preliminary treatment units, (2) Imhoff tanks, (3) contact stabilization facilities, (4) trickling filters, (5) activated sludge facilities, (6) extended and submerged contact aeration facilities, (7) aerobic digesters, (8) aeration ditches, (9) stabilization ponds, (10) mechanical aeration systems, and (11) tertiary treatment. Provisions for sludge processing and digestion are prescribed. Facilities for chlorination shall be provided to protect the public health. Plant design shall incorporate all necessary facilities to assure safety. Design and operation features of sewerage plants are also regulated. (Shelnut-Florida)
W71-11640

5E. Ultimate Disposal of Wastes

A STOCHASTIC MODEL FOR MARINE WASTE DISPOSAL,
Tallinn Polytechnic Inst. (USSR). Scientific Research Lab. of Sanitary Technique.
A. Aitsam.
International Association on Water Pollution Research, Advances in Water Pollution Research, Proceedings of 4th International Conference, Prague, p 837-842, 1969. 6 p.

Descriptors: *Waste water disposal, *Sea water, *Water quality control, *Sewage disposal, *Stochastic processes, Economics, Flow, Pollutants, Diffusion, Probability, Mathematical models.

An attempt was made to present the general scheme and basis for a stochastic model for predicting water quality where sewage was discharged into the marine environment. The aim of the engineering calculations involved in the discharge of sewage into bodies of water was to determine what kind of economically motivated measures should be taken to guarantee compliance with the above mentioned requirements. Since water quality depends on a large number of simultaneously acting factors (water flow, discharge of sewage, quantity of pollutants in sewage, rate of turbulence in the water resource, etc.) each of which in its turn depends on several causes, stochastic processes as a mathematical basis were used. In applying a probability model of predicting the quality of the water it was necessary to determine the standard probability characteristics of the changes of parameters of the water quality. The standard spectral density of the parameter from the equation of semi-empirical diffusion at a given spectrum of flows of the water body and at the mathematical expectation of the standard was determined. (Veverka-Cornell)
W71-10981

DIKED DISPOSAL AREA NO. 2, BUFFALO OUTER HARBOR, BUFFALO, NEW YORK.
Army Engineer District, Buffalo, N.Y.

Available from the National Technical Information Service as PB-198 719-D, $3.00 in paper copy, $0.95 in microfiche. Draft environmental statement, 2 March 1971. 3 p.

Descriptors: *Dikes, *Solid wastes, *Environmental effects, *Land fills, Waste disposal, Dredging, Sedimentation.
Identifiers: *Environmental surveys, *New York, Earthfills, Sedimentation, *Environmental impact statements, *Buffalo, New York, *Solid waste disposal.

Project Description--Diked Disposal Area No. 2, known locally as Times Beach, is an approximately forth-six acre alongshore parcel adjacent to and southerly of, the United States Coast Guard Station in the Outer Harbor of Buffalo, New York, at the easterly end of Lake Erie. The area, approximately 1,600 feet long by 1200 feet wide, is unused, unsightly, and unattended. Utilization of this area as a small-boat-harbor had been anticipated by placement of rockfill, made available during previous harbor deepening operations, to form portions of a dike along the lakeward side of the area. This project proposes completion of the dike as shown on the attached drawing, and subsequent use of the area as a place of containment of polluted dredged material from Buffalo Harbor and vicinity. The filling of the area will cause loss of identity to a tract of land having fish and wildlife resource values low to moderate in character. Short term adverse environmental impacts during construction will be only increased traffic and odors.
W71-10990

ELVES V KING COUNTY (INJUNCTIVE RELIEF AGAINST MUNICIPAL SEWAGE DISPOSAL).
For primary bibliographic entry see Field 06E.
W71-10995

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE OCEAN, COASTAL, AND OTHER WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11160

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE COASTAL WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11162

OCEAN DUMPING: THE OCEANS CRY FOR HELP,
For primary bibliographic entry see Field 05G.
W71-11430

AN OVERVIEW AND FORECAST OF FEDERAL REGULATION OF VESSEL DISCHARGES AND SPILLS,
Patton, Blow, Verill, Brand and Boggs.
For primary bibliographic entry see Field 05G.
W71-11441

ON SHORE FACILITIES FOR MARINE WASTE DISPOSAL,
American Association of Port Authorities. Environmental Affairs Committee.
For primary bibliographic entry see Field 05G.
W71-11446

NAVAL SHIPBOARD WASTES, FUTURE SYSTEMS FOR THEIR TREATMENT AND DISPOSAL,
Naval Ship Engineering Center, Hyattsville, Md.
For primary bibliographic entry see Field 05G.
W71-11452

WASTE MANAGEMENT SYSTEMS FOR RECREATIONAL AND COMMERCIAL VEHICLES,
Environmental Protection Agency, Wash., D.C.
For primary bibliographic entry see Field 05G.
W71-11454

MARINE PROTECTION ACT OF 1971 (A BILL TO REGULATE THE DUMPING OF MATERIAL IN THE OCEANS, COASTAL, AND OTHER WATERS AND FOR OTHER PURPOSES).
For primary bibliographic entry see Field 06E.
W71-11488

CONSTRUCTION AND USE OF WASTE DISPOSAL WELLS.
Oregon Dept. of Environmental Quality, Salem.

Oregon Administrative Rules Compilation, Oregon Department of Environmental Quality, Salem, Ore, ch 340, secs 44-005 thru 44-045 (1970). 3 p.

Descriptors: *Oregon, *Well permits, *Waste disposal, *Sanitary engineering, Regulation, Permits, Administrative agencies, State governments, Local governments, Legal aspects, Well regulations, Planning, Water resources development, Subsurface waters, Sewage disposal, Sewage treatment, Environmental engineering, Industrial wastes, Public health, Water pollution sources, Waste treatment, Ultimate disposal, Groundwater, Supervisory control (Power).

A waste disposal well is defined as any natural or man-made hole, crevasse, fissure, or opening in the ground which is used or is intended to be used for the disposal of sewage, industrial, agricultural or other wastes. Certain authorized and regulated openings are excepted. The State Department of Environmental Quality shall authorize certain governmental entities as approved permit issuing agencies. It shall be necessary to get a permit from such an agency in order to construct or put in operation any waste disposal well for the disposal of sewage. It shall be necessary to obtain a permit from the Department of Environmental Quality if the well is for the disposal of sewage from a system serving more than 25 families or 100 people or wastes other than sewage. A permit from the Department shall be required for anyone maintaining or using any waste disposal well after January 1, 1975. Any permit shall be issued only in geographical areas where the governmental unit legally authorized to provide sewerage services has filed an approved sewerage program and time schedule. Abandoned wells shall be plugged and sealed. (Johnson-Florida)
W71-11500

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE OCEAN, COASTAL, AND OTHER WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11533

5F. Water Treatment and Quality Alteration

LABORATORY STUDIES WITH A SELECTIVE ENTEROCOCCUS MEDIUM,
Long Island Jewish Medical Hospital, New Hyde Park, N.Y.
For primary bibliographic entry see Field 05A.
W71-11306

DETECTION AND CONTROL OF HYDROGEN POLYSULFIDE IN WATER,
Santa Barbara Water Dept., Calif.
Joseph T. Monscuitz, and Leonard D. Ainsworth.
Public Works, Vol 101, No. 9, September 1970, p 113-115, 11 ref.

Descriptors: *Hydrogen sulfide, *Odor, Sulfur, Chlorination, Filtration, Activated carbon, Adsorption, Oxidation, Ozone, Water softening, Precipitation (Chemical), Eutrophication, *Water treatment, California.
Identifiers: *Intrusion, *Santa Barbara, *Lake Cachuma (Calif).

Hydrogen polysulfide can be formed under a variety of environmental conditions, and it can be easily detected by its characteristic odor. The municipality of Santa Barbara, California, draws part of its summer water supply from Lake Cachuma, a lake which suffers from chronic and periodically acute plankton growth. Water treatment plants constructed to deal with these waters are designed for odor removal but produce very poor effluents even though both plants reduce turbidity to less than 0.5 JTU. Coagulant over dosage was found to help at one plant, but the diatomaceous earth filters at the other plant passed the colloidal sulfur on through. All known physico-filters at the other plant passed the colloidal sulfur on through. All known physico-chemical treatment methods were experimented with and eliminated. Massive doses of hydrogen peroxide or ozone were found to correct the problem, but these also were eliminated by reason of excess cost. Precipitation-softening was also dismissed for the same reason. It was finally discovered that addition of anhydrous sodium metabisulfite drives the sulfite-sulfur reactions to the formation of the relatively stable sulfate. This treatment method must allow the ploysulfides to first be produced in order for the problem to be eliminated, but no other alternative has been found. No cost figures were presented. (Lowry-Texas)
W71-11396

THE EFFECTIVENESS OF A CONTACT FILTER FOR THE REMOVAL OF IRON FROM GROUND WATER,
Alaska Univ., College. Inst. of Water Resources.
Steve W. Kim.
Available from the National Technical Information Service as PB-202 211, $3.00 in paper copy, $0.95 in microfiche. Alaska Institute of Water Resources, College, Report IWR 13, January, 1971, 46 p, 30 fig, 10 tab, 43 ref. OWRR Project A-025-ALAS (1).

Descriptors: *Iowa, *Filtration, *Groundwater, Alaska, *Filters, Flow, *Water treatment, Water purification, Particle size, Anthracite, Porous media, Sieves.
Identifiers: *Contact filters, Filter depth.

Various types of modified filters were to replace greensand filters which clogged when removing iron from ground water. A properly designed uniform-grain sized filter can increase the filtration time more than ten times that of ordinary sand or greensand filters. The filter medium was obtained by passing commercial filter materials between two standard sieves of a close size range, so that the resulting medium was of a uniform size. The head loss rate on such a medium was independent of the filter depth and was inversely proportional to the almost 3/2 power of the grain size. On the other hand, the filter depth was almost linearly proportional to the time of protective action. The effects of the grain size, filter depth, and filter material on the filter run were evaluated with a synthetic iron water; and optimum filter depths for each unisized material were determined. At identical filtration conditions, anthracite had a 70 to 110% longer filter run than the sand medium, and it was attributed to the greater porosity of the former. Expectedly, the time to reach initial leakage of the iron floc was greater with the coarse and more porous medium, but was reduced to an insignificant amount when the filter depth was increased to three to six feet. The performance of unsized filters on permanganate-treated ground water was much better than that of fine-grained greensand. The validity of the filtration theory and equations developed by Heerje and Lerk was tested in regard to the relationship between T1 (time of protective action) and grain size, and head loss rate and grain size. Experimental data did not fit the equations well.
W71-11399

INCIDENCE IN RIVER WATER OF ESCHERICHIA COLI CONTAINING R FACTORS,
Animal Health Trust, Stock (England).
H. W. Smith.
Nature, Vol. 228, No. 5278, p 1286-1288, December 26, 1970. 4 tab, 3 ref.

Descriptors: *E. coli, *Sewage, Rivers, Enteric bacteria, Salmonella, Sewage treatment, Water treatment, Diseases, Public health.
Identifiers: Antibiotics, Salmonella typhi, Great Britain.

Largely as a consequence of the widespread use of antibiotics, R factors, which transfer antibiotic resistance among enterobacteria, have become common in the non-pathogenic Escherichia coli of the alimentary tract of man and domestic animals in the British Isles. Many R organisms, especially those of human origin, would be expected ultimately to enter sewage and from this, possibly, rivers. The incidence of such organisms in British rivers has been determined with particular attention on E. coli with transmissible resistance to chloramphenicol, which is considered to be potentially the more dangerous because its resistance might be transmitted to Salmonella typhi and so render the treatment of typhoid fever more difficult. The effect of sewage treatment on the survival of R E. coli was also investigated. (McCann-Battelle)
W71-11540

HOW BROCKTON SOLVED ITS WATER SUPPLY PROBLEM,
Camp, Dresser and McKee, Boston, Mass.
Joseph E. Heney.
Public Works, Vol 102, No 7, p 60-62. July 1971, 1 fig, 3 photo.

Descriptors: *Water supply, *Water treatment, *Water pollution treatment, *Treatment facilities, Massachusetts.
Identifiers: *Brockton (Mass).

The basic source of water for Brockton, Massachusetts over the past sixty years has been Silver Lake. Previously, the treatment of the water to maintain its drinking quality was always limited to chlorination. Diversion of water from two recreation lakes increased the impurities in the water. Construction and operation of the water treatment plant in Brockton is discussed; it is capable of removing, color, iron, manganese and tastes and odors from the water. (Strachan-Chicago)
W71-11610

5G. Water Quality Control

A STOCHASTIC MODEL FOR MARINE WASTE DISPOSAL,
Tallinn Polytechnic Inst. (USSR). Scientific Research Lab. of Sanitary Technique.
For primary bibliographic entry see Field 05E.
W71-10981

ALTERNATE POLICIES FOR RIVER BASIN WATER QUALITY MANAGEMENT,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
Benjamin C. Dysart, III.
Proceedings of 14th Congress of International Association for Hydraulic Research, Hydraulic Research and its Impact on the Environment, Vol 5, p 419-1--419-6, 29 August-3 September, 1971. 6 p, 8 fig.

Descriptors: *River basins, *Water quality control, Waste water treatment, Economics, Costs, Optimization, Dynamic programming, Dissolved oxygen.

Due to the radical differences between the various treatment levels indicated by the optimal policy and a traditional, familiar policy such as 85% treatment for all wastewater dischargers, difficulty in implementing economically optimal plans for regional water quality management was encountered. The preliminary results of a two-year research project provided insight into the economics of alternate policies over a wide range of dissolved oxygen standards. For the river basin discussed, the optimal policies were found by using deterministic dynamic programming. For an intermediate water quality standard of 4 mg/l, three commonly considered alternate policies resulted in total costs to the system which were from 19 to 83 percent greater than the optimal cost. By analyzing the local costs for the individual waste dischargers for the alternate policies and standards, much information was obtained to anticipate their response to, interest in, and resistance to various approaches to river basin water quality management. (Veverka-Cornell)
W71-10985

SYSTEM ANALYSIS IN WATER RESOURCE MANAGEMENT,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
Roy W. Hann.
Water for Texas, 15th Annual Conference, Water Resources Institute, Texas A and M University, p 135-150, November 1970. 16 p, 8 fig, 3 tab.

Descriptors: *Systems analysis, *Water resources development, *Management, Simulation analysis, Evaluation, Water quality control, Load distribution, Hydrology, Estuaries, Economics.

The author categorized water resources systems models amenable to analysis by Systems Analysis techniques into 2 groups, namely simulation models and load evaluation models. The simulation models simulated the behavior of a given system under a given set of conditions or loadings. In other words, they were a numerical simulation of the behavior of the natural system. Simulation models were subdivided into hydrologic models, hydraulic models and water quality models. Load evaluation models assumed some design criteria for the given system and worked backwards to the allowable load to match this criteria. The number of such models were more limited because many simulation models could not be easily reversed to become load evaluation models. The basic importance of load evaluation models was that they permitted direct evaluation of the answer desired. For the purpose of estuarine water quality management, the application of one load evaluation model, namely the 'Completely Mixed Model' for the Houston Ship Channel, was discussed. Also illustrated was one simulation, namely the 'ESTPOL' (estuarine problem oriented language) system for steady state water quality profile determinations. (Veverka-Cornell)
W71-10987

NOOKAGEE DAM, WESTMINISTER, MASSACHUSETTS.
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 04A.
W71-10992

GAME AND FISH COMM V FARMERS IRRIGATION CO (STATE FISH HATCHERY'S LIABILITY FOR WATER POLLUTION).
For primary bibliographic entry see Field 06E.
W71-10997

CUMMINGS V CORPORATION COMM OF OKLAHOMA (COURT SUPERVISION OVER AGENCY POLLUTION REGULATIONS CONCERNING THE OIL INDUSTRY).
For primary bibliographic entry see Field 06E.
W71-10998

BROWN V LUNDELL (OIL AND GAS POLLUTION OF FRESH WATER SUPPLY).
For primary bibliographic entry see Field 06E.
W71-11002

HUMBLE PIPE LINE CO V ANDERSON (OIL PIPELINE OPERATOR'S LIABILITY FOR POLLUTION OF ADJACENT WATERS).
For primary bibliographic entry see Field 06E.
W71-11003

POWERS IN RESPECT OF NEW OIL AND GAS POOLS AND FIELDS (REGULATORY POWER TO PREVENT WATER POLLUTION).
For primary bibliographic entry see Field 06E.
W71-11013

BARAKIS V AMERICAN CYANAMID CO (CHEMICAL COMPANY'S LIABILITY FOR CROP DAMAGE FROM EFFLUENT DISCHARGE).
For primary bibliographic entry see Field 06E.
W71-11020

ELLISON V RAYONIER INC (PRIMARY JURISDICTION IN DETERMINING VIOLATIONS OF POLLUTION STANDARDS).
For primary bibliographic entry see Field 06E.
W71-11024

TURBIDITY PENETRATION IN INFILTRATION GALLERIES,
Zimmerman, Evans and Leopold, Augusta, Ga.
For primary bibliographic entry see Field 05B.
W71-11087

SUMMARY OF THE OCEANOGRAPHY AND SURFACE WIND STRUCTURE OF THE PACIFIC SUBARCTIC REGION IN RELATION TO WASTE RELEASES AT SEA,
Federal Water Quality Administration, Corvallis, Oreg., National Coastal Pollution Research Program.
Richard J. Callaway.
Federal Water Quality Administration, Pacific Northwest Water Laboratory Working Paper No 76, September 1970. 66 p, 56 fig, 1 tab, 9 ref.

Descriptors: *Oily water, *Waste disposal, *Pacific Ocean, *Alaska, *Path of pollutants, Water pollution sources, Water pollution control, International waters, International law, Ships, Oceanography, Currents (Water), Winds, Water circulation.
Identifiers: *Gulf of Alaska.

The physical oceanography and surface wind structure of the Gulf of Alaska and waters adjacent to the Pacific Coast of Alaska are outlined. This information is used to evaluate the efficacy of the 50-mile International Agreement Zone inside which vessels are prohibited from discharging oily ballast waters and slop oil with a concentration greater than 100 ppm. Nonsoluble or sparingly soluble liquids such as those normally discharged at sea from freighters and tankers discharging oily ballast or slops from tank-cleaning operations will eventually end up on Alaskan or other beaches no matter where they are discharged in the Pacific north of about 45 deg N latitude. Material once inside the southeast Alaskan inland waters will be effectively trapped. Wastes discharged at depth in the vicinity of Cook Inlet will probably move into the estuary with bottom water which replaces waters moving out at the surface. Releases near the 50-mile zone along the Aleutians will most likely either end up on the Islands or enter the Bering Sea. The 50-mile zone is ineffective, in fact, there is no limit that could be set that would ensure that sea discharges would not effect remote areas, much less the immediate region of the discharge. Biological observations point out that there is no desert in the sea where wastes can be discharged and put out of mind.
W71-11109

FEDERAL INSTALLATIONS, FACILITIES, AND EQUIPMENT POLLUTION CONTROL ACT (AMENDING THE FEDERAL WATER POLLUTION CONTROL ACT TO PROVIDE FOR IMPROVED COOPERATION BY FEDERAL AGENCIES TO CONTROL WATER AND AIR POLLUTION FROM FEDERAL INSTALLATIONS AND FACILITIES).
For primary bibliographic entry see Field 06E.
W71-11140

THE CPA'S ROLE IN RESTORING THE ECONOMICAL BALANCE,
Price Waterhouse and Co, Philadelphia, Pa.
For primary bibliographic entry see Field 07B.
W71-11157

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE OCEAN, COASTAL, AND OTHER WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11160

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO PROTECT THE NAVIGABLE WATERS OF THE UNITED STATES FROM FURTHER POLLUTION BY REQUIRING THAT SYNTHETIC PETROLEUM-BASED DETERGENTS MANUFACTURED IN THE UNITED STATES OR IMPORTED INTO THE UNITED STATES BE FREE FROM PHOSPHORUS.
For primary bibliographic entry see Field 06E.
W71-11161

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE COASTAL WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11162

ANTIPOLLUTION LEGISLATION AND TECHNICAL PROBLEMS IN WATER POLLUTION ABATEMENT,
W. B. Hart.
In: Water for Industry, Publication of the American Association for the Advancement of Science, Washington, D.C., p 79-87 (1956). 9 p.

Descriptors: *Water pollution, *Legislation, *State governments, *Pollution abatement, Federal government, Administrative agencies, Water pollution treatment, Control, Pollutants, Water pollution effects, Water pollution sources, Public health, Water law, Streams, Rivers, Navigable waters, Interstate compacts, Legal aspects, Water pollution control.

This article discusses six policy considerations of antipollution legislation and technical problems of water pollution abatement: (1) federal, as opposed to state, legislation to control water pollution; (2) stream protection to fit regional water uses; (3) direct and indirect antipollution laws; (4) laws for water protection to serve water conservation; (5) state compacts; and (6) federally controlled waterways. The article traces the development of both federal and state antipollution legislation. Direct antipollution legislation is defined as those laws which clearly state what treatment is required for wastes, and which prescribe the penalties for violation; indirect laws empower an administrative agency to promulgate rules and regulations to control pollution. After mentioning the problems involved in interstate commerce and federal legislation, the author examines the difficulty in deciding how clean a stream should be. It is observed that two approaches are commonly used to answer the question: chemical and biological. Various methods of treating water under both approaches are discussed. In conclusion, it is noted that two major problems remain: (1) arousing public interest in water pollution and (2) determining suitable methods of waste treatment and pollution abatement. (Hart-Florida)
W71-11164

GENERAL WATER QUALITY CRITERIA AND SPECIFIC WATER QUALITY STANDARDS.
Maryland Water Resources Commission, Annapolis, Md.; and Maryland Dept. of Water Resources, Annapolis.
For primary bibliographic entry see Field 06E.
W71-11165

STATUTORY POLLUTION CONTROL IN PENNSYLVANIA,
For primary bibliographic entry see Field 06E.
W71-11169

THE USE OF PRIVATE ACTIONS TO CONTROL ENVIRONMENTAL POLLUTION IN PENNSYLVANIA,
For primary bibliographic entry see Field 06E.
W71-11170

CONNECTICUT (ANALYSIS AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE WATER POLLUTION LAW),
For primary bibliographic entry see Field 06E.
W71-11172

DELAWARE (ANALYSIS AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE WATER POLLUTION LAW),
For primary bibliographic entry see Field 06E.
W71-11173

GEORGIA (ANALYSIS AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE WATER POLLUTION LAW),
For primary bibliographic entry see Field 06E.
W71-11174

ILLINOIS (ANALYSIS OF STATE WATER POLLUTION LAW AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE LAW),
For primary bibliographic entry see Field 06E.
W71-11175

OIL POLLUTION--JUDICIAL REACTIONS,
For primary bibliographic entry see Field 06E.
W71-11177

A SURVEY OF NATIONAL LAWS ON THE CONTROL OF POLLUTION FROM OIL AND GAS OPERATIONS ON THE CONTINENTAL SHELF,
For primary bibliographic entry see Field 06E.

W71-11178

DETERGENT POLLUTION CONTROL ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO BAN POLYPHOSPHATES IN DETERGENTS AND TO ESTABLISH STANDARDS AND PROGRAMS TO ABATE AND CONTROL WATER POLLUTION BY SYNTHETIC DETERGENTS).
For primary bibliographic entry see Field 06E.
W71-11181

DETERGENT ENZYME CONTROL ACT OF 1971 (A BILL TO PROHIBIT THE USE OF ENZYMES IN DETERGENTS).
For primary bibliographic entry see Field 06E.
W71-11183

A BILL TO AMEND SECTION 4 OF THE ACT OF MARCH 3, 1965, TO PROHIBIT THE DUMPING OF CERTAIN SPOIL INTO THE GREAT LAKES.
For primary bibliographic entry see Field 06E.
W71-11184

A BILL TO AMEND THE ACT OF AUGUST 1, 1958, TO AUTHORIZE RESTRICTIONS AND PROHIBITIONS ON THE USE OF INSECTICIDES, HERBICIDES, FUNGICIDES, AND PESTICIDES WHICH POLLUTE THE NAVIGABLE WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11185

A BILL TO AMEND THE ACT OF AUGUST 3, 1968 (82 Stat 625), TO PROTECT THE ECOLOGY OF ESTUARINE AREAS BY REGULATING DUMPING OF WASTE MATERIALS, TO AUTHORIZE THE ESTABLISHMENT OF A SYSTEM OF MARINE SANCTUARIES, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W71-11187

A BILL TO PROHIBIT OFFICERS AND EMPLOYEES OF THE UNITED STATES FROM DUMPING OR PERMITTING THE DUMPING OF DREDGINGS AND OTHER REFUSE MATERIALS INTO ANY NAVIGABLE WATER.
For primary bibliographic entry see Field 06E.
W71-11188

A BILL TO AMEND THE ACT OF JUNE 29, 1888, RELATING TO THE PREVENTION OF OBSTRUCTIVE AND INJURIOUS DEPOSITS IN THE HARBOR OF NEW YORK, TO PROVIDE FOR THE TERMINATION OF CERTAIN LICENSES AND PERMITS.
For primary bibliographic entry see Field 06E.
W71-11189

SANTA BARBARA CHANNEL MORATORIUM AND ECOLOGICAL PRESERVE ACT (A BILL TO PROVIDE FOR A FEDERAL ECOLOGICAL PRESERVE IN A PORTION OF THE OUTER CONTINENTAL SHELF IN THE SANTA BARBARA CHANNEL, TO PROVIDE FOR A MORATORIUM ON DRILLING OPERATIONS, AND FOR OTHER PURPOSES).
For primary bibliographic entry see Field 06E.
W71-11192

EFFECT OF LOW-FLOW HYDROLOGIC REGIMES ON WATER QUALITY MANAGEMENT,
North Carolina Water Resources Research Inst., Raleigh.
Jabbar K. Sherwani.
Available from the National Technical Information Service as PB-202 011, $3.00 in paper copy, $0.95 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Report UNC-WRRI-71-26, March 1971, 177 p, 34 fig, 46 tab, 34 ref. OWRR Project A-010-NC (1).

Descriptors: *Streamflows, *Time series analysis, Wate quality, Water pollution effects, *Flow augmentation, North Carolina, *Low flow, Management, *Model studies, Low flow augmentation, Hydrologic data.
Identifiers: *Low streamflows.

The low-flow characteristics of thirty-seven gauging stations in North Carolina are analyzed on the basis of duration curves, theoretical probability distributions and techniques of time-series analysis. The sensitivity of flow magnitudes to duration and return period is considered. There is wide variation in the low-flow behavior of individual streams. The conclusion is reached that the Weibull distribution and autoregressive schemes of the first or second order can adequately represent annual minimum flows. A study of weekly flow on four gauging stations reveals that sophisticated, state-of-the-art models are required to preserve the duration distribution of historical flows. The relevance and suitability of the existing water quality data to the emerging needs of water quality management are investigated. The relationships of water quality parameters to stream and flow factors are considered. For efficient water resource planning detailed specification of the distribution of various quality parameters is needed. This would require a more sophisticated approach to the monitoring of water quality parameters. A possible framework for a conceptual water-quality management model is presented. A realistic model should permit simultaneous consideration of several factors. It is suggested that decomposition might make the model computationally tractable. Simultaneous consideration of flows and temperatures on several streams shows that critical conditions are not necessarily coincident with lowest flows.
W71-11201

EVALUATING OIL SPILL CLEANUP AGENTS--DEVELOPMENT OF TESTING PROCEDURES AND CRITERIA,
California State Dept. of Fish and Game, Rancho Cordova. Water Pollution Control Lab.
Charles R. Hazel, Fred Kopperdahl, Norman Morgan, and Walter Thomsen.
California Water Resources Control Board Publication No 43, 1971. 150 p, 67 fig, 17 tab, 100 ref. Agreement No. 8-3-437.

Descriptors: *Water pollution treatment, *Oily water, *Safety, *California, *Water pollution effects, Surfactants, Biodegradation, Toxicity, Biochemical oxygen demand, Bioassay, Water pollution control.
Identifiers: *Oil spills, *Oil spill cleanup.

Technical data are provided to be used as criteria for licensing and regulating the use of oil spill cleanup agents. The criteria are: (1) toxicity, (2) performance effectiveness, and (3) physical-chemical descriptions. Bioassays were performed using fresh and saltwater biota to establish 96-hour TLm values for dispersants, oil, and combinations of the two. Static, 24-hour renewal and continuous-flow bioassays were conducted. Biodegradation of the dispersants was tested in three ways: (1) biochemical oxygen demand (BOD), (2) foam-calibration, and (3) toxicity decay bioassay technique developed by the Department of Fish and Game, Water Pollution Control Laboratory. Performance effectiveness was tested by modifying the FWQA and the U.S. Navy performance tests. Miscibility with seawater, percent of oil emulsified, sinking of the oil, and dispersion after two and six hours were the criteria. Gas liquid chromatography infrared spectrophotometry, a colorimetric method, Oil red O method, and the Weatherburn tests were conducted for identification of pure dispersants and of dispersants in seawater. Among the three general types of collecting, sinking, and dispersing agents, dispersants are regarded to have the greatest potential for causing harm to the environment. Collecting agents and sinking agents are relatively inert, insoluble, and assumably nontoxic. (Knapp-USGS)
W71-11263

PURITY AND UTILITY: DIVERSITY OF INTEREST IN RIVER POLLUTION.
For primary bibliographic entry see Field 06E.
W71-11283

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 06E.
W71-11289

THE REFUSE ACT: ITS ROLE WITHIN THE SCHEME OF FEDERAL WATER QUALITY LEGISLATION.
New York Univ., Bronx. Dept of Law.

New York University Law Review, Vol 46, No 2, April, 1971. p 304-352, 316 ref.

Descriptors: *Legislation, *Water quality control, *Pollution abatement, *Waste disposal, Local governments, Legal aspects, Water law, Waterways, Public rights.
Identifiers: *Refuse Act, Federal Water Pollution Control Act.

Federal and state governments are developing pollution control legislation and waterways are receiving particular attention, under the Federal Water Pollution Control Act and the Refuse Act, which prohibits the discharge of all pollutants into navigable waterways and is a basis for most of the court cases against pollution control violators. Judicial interpretation of the Refuse Acts deals with the requirement of obstruction to navigation, waterways covered by the act, definition of refuse matter, conduct prohibited by the act, and penalties and remedies under the act, citing various cases as examples. The Federal Water Pollution Control Act and its amendments are also considered in regard to their effectiveness and limitations. The enforcement of the Refuse Act by the Secretary of the Army and the Corps of Engineers, taking into account certain permitted exceptions, the requirement to weigh environmental considerations and its future use, is discussed. By typing permit issuance to water quality standards, a more efficient means has been created to enforce those standards, which are, however, state-established and occasionally inadequate because of industry influence. Citizens have the right to sue any person, including the Government, for violations of the act, and thus serve an important function in effectuating the environmental policies of Congress. (Smith-PAI)
W71-11294

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 06E.
W71-11310

DETERMINATION OF POLLUTIONAL POTENTIAL OF THE OGALLALA AQUIFER BY SALT WATER INJECTION,
Robert S. Kerr Water Research Center, Ada, Okla.
Leslie G. McMillion, Sr. and Bruce W. Maxwell.
Available from the National Technical Information Service as PB-202-227, $3.00 in paper copy. Jun 1970, 80 p, 9 fig, 2 tab, 11 ref, 3 append. EPA Program 16060--06/70

Descriptors: *Injection wells, *Transmissivity, *Aquifer characteristics, Groundwater, Water pollution control, Oklahoma, *Brine disposal, Storage Coefficient, Aquifers, Water pollution sources, Brines, Oil wells, Waste water disposal, Wells, Underground storage, Injection.
Identifiers: *Ogallala aquifer, Texas County (Okla), Glorietta sandstone, Salt water injection, *Groundwater contamination, Disposal wells.

Field studies were conducted to determine whether contamination of the Ogallala Aquifer could result from the current practice of injection of oil-field brines into the Glorieta Sandstone, which lies 500 to 1,000 feet below the Ogallala in Texas County, Oklahoma--the study area. The project was designed on the basis that for brines to move from the Glorieta to the Ogallala the potentiometric pressures in the Glorieta would have to be higher than water-level elevations of the Ogallala. Since the hydraulic characteristics of the Glorieta Sandstone were needed for determining this fluid relationship, a technique was developed for making aquifer tests in brine disposal wells. The technique has application in certain water resources investigations and in similar situations. (Kelley-EPA)
W71-11361

REGULATIONS PERTAINING TO WASTE DISCHARGE PERMITS.
Oregon Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 06E.
W71-11367

EVALUATION OF STORM STANDBY TANKS-COLUMBUS, OHIO,
Dodson, Kinney and Lindblom, Columbus, Ohio.
For primary bibliographic entry see Field 05D.
W71-11371

GELLING CRUDE OILS TO REDUCE MARINE POLLUTION FROM TANKER OIL SPILLS.
Western Co. of North America, Richardson, Texas. Research Div.

Copy available from GPO Sup Doc, Wash, D. C., $1.25; PB-202 239. Water Pollution Control Research Series, January 1971, 137 p, 4 fig, 15 tab, 4 ref. EPA Program 15080 DJN 1/71.

Descriptors: *Ships, *Accidents, *Water pollution sources, *Oil wastes, Oil, Gels, Colloids, Shear, Mixing, Viscosity, Temperature, Flow, Pumps, Cost analysis, Analytical techniques, Water pollution control.
Identifiers: *Collisions, *Oil spills, Oil tankers, Marine pollution.

All available information concerning the gelling or sodifying of petroleum products was gathered to provide a starting point for testing of materials intended to gel oils for the reduction of oil loss and resultant marine pollution. Laboratory evaluations of both foreign and domestic oils using a wide range of gelling agents were performed. Measurements of gel strength by the rotary viscosimeter, the penetrometer, the rheogram and others were compared to determine their validity and accuracy. For the purposes of comparison and because of the ease of operation, the penetrometer was used for this work. An amine/isocyanate combination was found to have the best gelling properties of the compounds tested. However, the gel produced still did not completely fulfill the needs since oil could still escape from a ruptured tanker. However, the rate at which the oil escaped would be considerably less, and the gelled oil would be in the form of clumps and would not form a slick. Two systems, a helicopter-borne system serving a geographical area and a ship-borne system serving each individual ship, were evaluated on a basis of additional total cost per ton-mile. An average increase of .051 mils per ton mile for the ship-borne system was reported, while the ari-borne system cost only .002 mils/ton mile. Clean-up costs have been estimated at $150 to $200/bbl, so average delivery time is a critical factor in oil lost. (Lowry-Texas)
W71-11374

DETECTION AND CONTROL OF HYDROGEN POLYSULFIDE IN WATER,
Santa Barbara Water Dept., Calif.
For primary bibliographic entry see Field 05F.
W71-11396

WATER QUALITY STANDARDS SUMMARY (NEW MEXICO).
New Mexico Water Quality Control Commission, Santa Fe; and Federal Water Pollution Control Administration, Washington, D.C.

Feb 1970. 29 p, 1 fig, 2 tab.

Descriptors: *New Mexico, *Water quality control, *Standards, *Interstate rivers, Water pollution control, Pollution abatement, Waste water treatment, Water pollution sources, Water pollution treatment, Treatment facilities, Sewage treatment, Waste disposal, Sewage disposal, Cities, Administration, Regulation, Pollutants, Waste dilution, Effluents, Beneficial use, Industrial wastes, Municipal wastes, Legal aspects.

Water quality standards for the interstate waters of New Mexico are summarized. The standards consist of three major components: water uses, numerical water quality standards, and a plan of implementation. All beneficial uses of water are allowed. The general aim in designating uses for particular interstate waters is to recognize present and practicable future uses in order to provide, where possible, for a variety of uses. In order to enhance water quality, the standards specifically provide that no interstate waters may be used solely or primarily for waste assimilation. The establishment of numerical and narrative limits on pollutants are necessary for the enhancement of water quality. The standards apply to the quality of stream water at the midpoints of streams, rather than to effluent quality. Standards for specific rivers are set forth with respect to: (1) odor, (2) floating solids, (3) turbidity, (4) color, and (5) other necessary chemical criteria to determine water quality. The implementation plan prescribes the requirements for treatment and control of municipal and industrial waste discharges, including monitoring of waste water discharges. (Smiljanich-Florida)
W71-11421

REGULATIONS GOVERNING WATER POLLUTION CONTROL IN NEW MEXICO.
Water Quality Control Commission, Santa Fe, N.M.

1971. 9 p.

Descriptors: *New Mexico, *Water pollution control, *Administrative agencies, *Regulation, Water quality control, Effluents, Standards, Sewage disposal, Administration, Legislation, Legal aspects, State governments, Treatment facilities, Rio Grande, Water pollution, Permits.

State regulations governing water pollution control cover the following subjects: (1) notice of intent to discharge, (2) filing of plans and specifications for construction of sewerage systems, (3) disposal of refuse, (4) effluent quality, and (5) procedures for requesting a variance. Any person intending to make a new water contaminant discharge or to alter the character or location of an existing discharge shall file a notice of such proposed discharge with the Health and Social Services Department. The reporting of sewage discharges from single family dwellings into individual disposal facilities is not required. Any person proposing to construct or modify any sewerage system must file plans and specifications with the Department of Health and Welfare. No person shall dispose of any refuse in a natural watercourse. Likewise, no person shall cause effluents to discharge to a watercourse if the effluent contains concentrations of certain prescribed constituents in excess of specified values. Additionally, no person shall cause effluent from a community sewerage system to discharge into the Rio Grande Basin. Provisions for requesting a variance cover petitions, notice, hearings, orders, and timeliness. (Smiljanich-Florida)
W71-11422

CALIFORNIA'S WATER POLLUTION PROBLEM.
Stanford Law Review, Vol 3, p 649-666, 1951. 18 p.

Descriptors: *California, *Water pollution control, *Water pollution treatment, *Administrative agencies, Water pollution sources, Water quality control, Treatment facilities, Federal government, State governments, Legislation, Legal aspects, Judicial decisions, Coordination, Permits, Standards, Administration.
Identifiers: *Dickey Water Act.

Because of inadequate common law remedies, legislation and administrative remedies are necessary tools in combating water pollution. Such remedies are available to compensate injuries occurring before their enactment as well as forewarning industries against future pollution. Additionally, since pollution is a technical matter involving problems of engineering, sanitation, chemistry, and biology, administrative remedies are more effective. In California the Dickey Water Act was passed, setting up regional water pollution control boards, and a state control board was established to coordinate state activities. The health department has control over contamination, but has no permit power. Each regional board is to prescribe pollution control requirements. The boards also have power to seek out existing sources of pollution. Stringent enforcement may be hampered by conflicts of interest among board members. The mechanics of the present legislation and the possibilities of conflicting jurisdiction are described. Upon failure to comply with a board's order, an action for injunction will be initiated. Federal interstate pollution control legislation is evaluated in relation to its effect on state programs. The most serious retardant to the success of the state's plan appears to be the lack of funds available for construction of community disposal facilities. (Shelnut-Florida)
W71-11423

POLLUTION PROBLEMS IN KANSAS,
Dwight F. Metzler.
Kansas Law Review, Vol 5, p 611-625, 1957. 15 p, 6 ref.

Descriptors: *Kansas, *Pollution abatement, *Industrial wastes, *Brines, Oil fields, Injection, Subsurface drainage, Oil wastes, Water pollution, Water pollution effects, Water pollution sources, Water pollution treatment, Water quality, Water quality control, Waste water (Pollution), Waste water treatment, Cities, Sewage disposal, Sewage treatment, Salinity, Waste disposal, Financing, Administrative agencies, State governments.

The available water supply in Kansas is too small, and Kansas cannot afford to render a portion of it unusable through pollution. Three general types of pollution are involved: (1) bacterial--measured by the concentration of fecal organisms; (2) chemical--particularly oil field brine; and (3) organic--caused by decomposition of organic material. To combat pollution, Kansas has adopted a river basin approach, with each major basin adopting its own pollution policies. The State Board of Health may issue and revoke discharge permits, or direct construction of treatment facilities in the basins. Municipal, industrial, and oil field brines are the three major sources of pollution in Kansas. Municipalities have built 44 sewage treatment plants under the Kansas river basin policy. The high concentration of salts in oil-field brine makes normal disposal difficult; hence surface ponds and injection wells are used for brine disposal. Brine disposal associations have been formed, and brine is being utilized as a repressuring medium. While much industrial waste is discharged into municipal sewage systems, many industries have their own treatment plants. New water pollution problems in Kansas will be caused by irrigation, technology, and industrial and municipal growth. Kansas has received many benefits from its ten year pollution abatement program. (Smiljanich-Florida)
W71-11424

OIL AND GAS CONSERVATION.
For primary bibliographic entry see Field 06E.
W71-11425

RULES AND REGULATIONS FOR STANDARDS OF WATER QUALITY FOR THE INTERSTATE WATERS OF IDAHO AND DISPOSAL THEREIN OF SEWAGE AND INDUSTRIAL WASTES.
Idaho State Board of Health, Boise.

1967. 10 p, 1 tab, 2 append.

Descriptors: *Idaho, *Water quality control, *Standards, *Water pollution sources, Water pollution, Water pollution control, Pollutants, Sewage disposal, Waste disposal, Treatment facilities, Water pollution treatment, Public health, Regulation, Administrative agencies, Waste treatment, Streams, Rivers, Turbidity, Oil, Toxicity, Coliforms, Water utilization, Legal aspects, Pollution abatement.

No wastes shall be discharged or otherwise disposed of in such a way as to violate the water quality standards contained herein. The degree of sewage or waste treatment required to restore and maintain the standards of quality shall be determined in each instance by the State Board of Health, taking into consideration the uses of the receiving stream, the size and nature of stream flow, the quantity and quality of sewage or wastes, and the presence of other sources of pollution. Water quality standards will be enforced through periodic sampling of various waters. General water quality standards for interstate streams are set forth, including a prohibition against the discharge of non-natural toxic chemicals, excess nutrients, turbidity, and oil. Specific water quality standards are set forth for various state rivers. Criteria are established for: (1) organisms of the coliform group where associated with fecal sources, (2) dissolved oxygen, (3) hydrogen ion concentration, and (4) temperature. A chart provides information on beneficial water uses to be protected for various rivers. (Smiljanich-Florida)
W71-11426

RULES AND REGULATIONS FOR THE ESTABLISHMENT OF STANDARDS OF WATER QUALITY AND FOR WASTE WATER TREATMENT REQUIREMENTS FOR WATERS OF THE STATE OF IDAHO.
Idaho State Board of Health, Boise.

1968. 7 p.

Descriptors: *Idaho, *Water quality control, *Standards, *Waste water treatment, Waste water (Pollution), Waste water disposal, Water pollution control, Pollution abatement, Water pollution, Water pollution sources, Waste disposal, Sewage disposal, Sewage treatment, Treatment facilities, Water pollution treatment, Pollutants, Regulation, Administration, Turbidity, Toxicity, Coliforms, Legal aspects.

In order to provide for a comprehensive and orderly water pollution control program, the following rules and regulations are set forth for the establishment of water quality standards and waste water treatment requirements. Minimum water quality standards are prescribed for all waters. Specific standards are prescribed for such criteria as: (1) organisms of the coliform group where associated with fecal sources, (2) dissolved oxygen, (3) hydrogen ion concentration, (4) temperature, and (5) turbidity. Any municipality or corporation operating any sewer facility resulting in waste water discharge shall furnish to the Department of Health such information as the Department may reasonably require to evaluate the effects on any receiving waters. Regulations are prescribed for accidental spills of deleterious materials, subsurface sewage disposal, treatment facility supervision, secondary and treatment requirements, and agricultural use of sewage sludge or solid material containing disease-producing organisms. Waste discharges to underground waters shall receive, prior to discharge, such treatment as is necessary to render them equal in quality to existing underground waters, or such treatment as is necessary to bring such discharge into conformance with the Idaho Drinking Water Standards. (Smiljanich-Florida)
W71-11427

WATER QUALITY STANDARDS FOR SURFACE WATERS IN ARIZONA.
Arizona Dept. of Health, Phoenix. Water Quality Control Council.

1968. 129 p, 1 fig, 7 plate, 2 tab, 24 ref, 23 exhibits.

Descriptors: *Arizona, *Water quality, *Standards, *Water quality control, Water pollution control, Water pollution, Water pollution sources, Water pollution effects, Pollution abatement, Administrative agencies, Administration, State governments, Colorado River, Streams, Water Quality Act, Impaired water quality, Water properties, Water pollution treatment, Waste disposal, Water utilization, Water policy, Legal aspects.

Water quality standards are herein prescribed for Arizona's surface waters. A description of the major river systems and basins within the state includes their present level of water quality. Standards have been set according to beneficial water use. The water use categories are: (1) agricultural, (2) domestic water sources, (3) industrial, (4) propagation of aquatic and wildlife resources, and (5) recreation. Each beneficial water use requires certain indicators of water quality as desirable or essential. Pertinent indicators, such as salinity and bacteriological quality, are investigated for adequate protection of each beneficial use. Specific numerical water quality objectives are formulated in consideration of these indicators and the effects upon the economy of the area. The policy of the Department of Health will require the maximum practical degree of treatment for all waste sources. The discharge of wastes containing toxic substances into any waters is prohibited without a valid permit issued by the Department. The State Water Quality Control Council has primary responsibility in implementing water quality standards. Various studies such as the activities of the Arizona Water and Pollution Control Association, are included in the report. (Smiljanich-Florida)
W71-11428

DUE PROCESS AND POLLUTION: THE RIGHT TO A REMEDY,
Ferdinand F. Fernandez.
Villanova Law Review, Vol 16, No 5, p 789-814, 1971. 26 p, 211 ref.

Descriptors: *Pollution abatement, *Remedies, *Public rights, *Water pollution control, Water pollution effects, Water pollution, Air pollution, State governments, Federal government, Jurisdiction, Judicial decisions, Legislation, Damages, Public health, Institutional constraints, Environmental effects, Legal aspects, Adjudication procedure, Non-structural alternatives.
Identifiers: *Constitutionality.

Pollution threatens everyone with grave health hazards. An examination of the inadequacies of traditional common law remedies points to the need for new solutions. If there is a tendency to refuse to reach for the tools at hand or to rapidly fashion new ones through legislation, constitutional law may be looked to in speeding the process. Due process requires the government to provide people with remedies for injuries caused to their persons or property by pollution. When the pollutant threatens to cause long-term damage by reason of its chronic presence, injunctive or other similar relief must be provided. The history of due process is traced, and cases are discussed which reaffirm the proposition that government must provide an effective remedy for every wrong to individuals. Sovereign immunity and eminent domain are also examined to support the major thesis by analogy. Where it is obvious that the only effective remedy is injunctive relief, impairment of that remedy will offend fundamental principles of due process and justice. Through due process the environmental crisis may be abated once citizens are given the effective remedies due to them. (Smiljanich-Florida)
W71-11429

OCEAN DUMPING: THE OCEANS CRY FOR HELP,
Michael J. Harrington.
Suffolk University Law Review, Vol 5, No 3, p 878-898, 1971. 21 p, 85 ref.

Descriptors: *Water pollution control, *Oceans, *Waste disposal, *Environmental sanitation, Legislation, Water policy, Legal aspects, Federal government, Industrial wastes, Sewage sludge, Solid wastes, Chemical wastes, Oil wastes, Pollutants, Waste dilution, Waste assimilation, Waste identification, Water pollution sources, Landfills, Self-purification, Water Quality Act, Rivers and Harbors Act, Remedies, Navigable waters, Pollution abatement.
Identifiers: *Federal Water Pollution Control Act.

A serious problem of pollution has developed in the oceans because they serve as the final receptacle for much of the nation's wastes. Such wastes are either dumped directly into the ocean or are carried there by rivers. This article first describes the nature and effects of the ocean dumping of seven major pollutants: industrial wastes, solid wastes, sewage sludge, dredge spoils, explosive and chemical munitions, oil sludge, and chemical wastes. It next discusses the ineffectiveness of existing federal laws that might be applicable to the problem of ocean dumping. The abatement process under the Federal Water Pollution Control Act is too long and cumbersome. The Water Quality Improvement Act offers some help but has not yet been fully implemented. The federal government has been reluctant to prosecute under the Refuse Act. This article states that land-based waste disposal is one of the most feasible alternatives to ocean dumping. It is suggested that effective legislation against ocean dumping is needed. Encompassed by such legislation would be: (1) broad classification of the waters covered, (2) strong standards and prohibitions, (3) stringent enforcement, and (4) strong penalties for violations of the standards prescribed. (Johnson-Florida)
W71-11430

HEARINGS BEFORE THE SUBCOMMITTEE ON AIR AND WATER POLLUTION OF THE COMMITTEE ON PUBLIC WORKS, UNITED STATES SENATE.

Hearings--S3687, S3468, S3470, S3471, S3472, S3181, S3484, S3500, S3507, S3614, S3688, S3697--Subcomm on Air and Water Pollution--Comm on Public Works, US Senate, April 20, 21, 27, 1970, part 1, p 1-401. 401 p, 9 tab, 12 ref, 1 append.

Descriptors: *Federal government, *Legislation, *Water pollution control, Effluents, Treatment facilities, Pollution abatement, Water law, Water policy, Legal aspects, Administration, Economics, Federal jurisdiction, Permits, Project planning, Public health, Regulation, Planning, Standards, Political aspects, Waste treatment, Waste disposal, Federal-state water rights conflicts, Assessments, Non-structural alternatives.
Identifiers: *Effluent charge.

Both a summary and the complete text of water pollution legislation pending before the Senate Subcommittee on Air and Water Pollution are contained in this record of hearings. Such legislation involved the following subjects: (1) increased appropriations for pollution control projects, especially waste treatment facilities; (2) enlargement of the federal role in water pollution abatement; (3) instituting effluent charges for wastes other than

sewage; (4) regulation of the ocean dumping of refuse; and (5) prohibition of phosphorus in detergents. Witnesses at the Hearings included Senator Proxmire and Secretary of the Interior Hickel. Much of the testimony was concerned with the proposed use of effluent charges as a means of deterring water pollution. Two economists testified that the current method of trying to enforce water quality standards was not effective; they stated that making polluters pay for what they discharge would be effective in forcing them to reduce discharges. Secretary Hickel discussed proposed changes in the abatement proceedings and jurisdiction of the federal government. Also included in the record is a list of new and reconvened enforcement conferences instituted by the Department of the Interior to compel compliance with applicable water quality standards. (Johnson-Florida)
W71-11431

THE EVOLUTION OF THE ENFORCEMENT PROVISIONS OF THE FEDERAL WATER POLLUTION CONTROL ACT: A STUDY OF THE DIFFICULTY IN DEVELOPING EFFECTIVE LEGISLATION,
Frank J. Barry.
Michigan Law Review, Vol 68, p 1103-1130, 1970. 28 p, 163 ref.

Descriptors: *Water pollution control, *Water Quality Act, *Administrative agencies, *Pollution abatement, Water quality, Water quality control, Water pollution, Legislation, Federal government, State governments, Legal aspects, Oil, Regulation.
Identifiers: *Water Pollution Control Act, *Clean Water Restoration Act.

The Federal Water Pollution Control Act has undergone five stages of evolution. Primary responsibility for water pollution control was given to the states in the original Act of 1948. Pollution in interstate waters, however, could be abated by federal authorities. Although the 1956 amendment was intended to enhance the enforcement provisions of the Act, more delay was introduced by the interstate conference requirement, and the polluter was assured of at least a one-year enforcement delay. The scope of the Act was broadened in 1961 to include almost all waters in the nation, and federal officials were given authority to abate intrastate pollution endangering health and welfare. The Water Quality Act of 1965 provides for the establishment of water quality standards for interstate waters, and federal authorities may abate pollution lowering the waters below the established standard. The Clean Water Restoration Act of 1966 enabled federal authorities to require reports concerning discharges. An organized national pollution abatement program is hindered by the Act's no pre-emption policy; nevertheless, the National Environmental Policy Act and Water Quality Improvement Act help solve the enforcement problems through establishment of the Council on Environmental Quality and provisions for national abatement of oil pollution. (Hart-Florida)
W71-11435

QUI TAM ACTIONS AND THE 1899 REFUSE ACT: CITIZEN LAWSUITS AGAINST POLLUTERS OF THE NATION'S WATERWAYS.

Conservation and Natural Resources Subcomm, House Comm on Gov't Operations, 91st Cong, 2d Sess (Comm print 1970). 25 p, 47 ref.

Descriptors: *United States, *Water pollution control, *Remedies, *Rivers and Harbors Act, Water quality control, Sewage disposal, Inland waterways, Channels, Cooperation, Judicial decisions, Legal aspects, Legislation, Federal government, State governments, Water pollution, Damages, Abatement.

The institution of qui tam actions is suggested as a basis for implementing the Refuse Act of 1899. A Qui tam is a civil action brought by a citizen to collect a fine or penalty, a share of which he is allowed to keep for himself by the statute imposing the fine. The availability of this action provides a monetary incentive to citizens to furnish information concerning violations and insures against laxity by public officials in enforcing the statute. While the Act does not explicitly state that citizens have such a right, neither does it explicitly deny this right. There is both American and English authority which supports the proposition that when a statute providing a reward to informers does not specifically authorize or forbid qui tam actions, such statute is to be construed as authorizing this action. Public policy arguments which favor qui tam actions under the Refuse Act are discussed. At a time when the courts are increasingly willing to allow citizens to enforce environmental policies of various federal statutes, the courts should not hesitate to allow qui tam actions. Procedures for citizen action under the Act are detailed. (Shelnut-Florida)
W71-11436

MARITIME LIABILITY FOR OIL POLLUTION--DOMESTIC AND INTERNATIONAL LAW,
Allan I. Mendelsohn.
George Washington Law Review, Vol 38, No 1, p1-31, 1969. 31 p, 90 ref.

Descriptors: *Oil industry, *Ships, *Water pollution, *Remedies, Damages, Oil, Oil wastes, Oily water, Federal government, International law, Law of the sea, Treaties, Legal aspects, Pollution abatement, Accidents, Insurance, Costs, Risks, Legislation, International waters, Foreign waters, Navigable waters, Water pollution control, Disasters.

A discussion of the limits of liability for oil pollution by vessels, primarily based upon bills proposed in the 90th and 91st Congresses, is provided herein. This article centers on the hearings of the Subcommittee on Air and Water Pollution of the Senate Public Works Committee, but hearings of the House Committees on Public Works and the Merchant Marine are also examined. Also discussed is a plan by the major oil companies to enter a voluntary agreement among oil tanker owners on the limits of liability for oil pollution. The author examines the analogy between aviation liability and vessel liability. Observations are made on the necessity and possibility of providing adequate marine insurance for oil pollution. International activities dealing with oil pollution are considered. The author concludes that absolute liability should be imposed upon vessel owners and the oil industry since they are in a better position than coastal shoreline owners to bear and distribute the risk involved. The author further feels that maritime insurance companies can profitably insure against oil pollution without unreasonable premiums and that such companies must modernize to meet the present needs of society. (Robinson-Florida)
W71-11437

WATER QUALITY STANDARDS IN PRIVATE NUISANCE ACTIONS.
Yale Law Journal, Vol 79, p 102-110, 1969. 9 p, 40 ref.

Descriptors: *Water Quality Act, *Water pollution control, *Water quality control, *Remedies, Reasonable use, Legislation, Legal aspects, Water law, Federal government, Water pollution, Standards, Water quality, Pollution abatement, Water resources, Riparian rights, Relative rights, Damages, Competing uses, Water rights, Adjudication procedure, Non-structural alternatives, Administrative agencies.

The Federal Water Quality Act and several state pollution statutes have proven ineffective due to bureaucratic timidity and deference to industry. The ineffectiveness of such legislation may revive the use of private nuisance actions to restore the quality of our water. The reasonable use theory of riparian rights and private nuisance actions are discussed by the author and related to pollution legislation. Courts have had a great deal of trouble in determining what constitutes a reasonable use. The Federal Water Quality Act may prove useful in determining reasonableness as it contemplates the establishment of water quality standards. These standards would not be controlling, but could be a very important factor in determination of reasonable use. The author feels that the most effective judicial use of standards would be a finding that a prima facie case had been made upon a showing that the standards had been violated. In the area of injunctive relief, the author maintains that the comparative injury doctrine is not justified because the public has a vital interest in protecting the quality of water. (Robinson-Florida)
W71-11438

PENNSYLVANIA'S PUBLIC INSTITUTIONAL ARRANGEMENTS FOR THE DEVELOPMENT AND CONSERVATION OF WATER RESOURCES.
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Engineering.
For primary bibliographic entry see Field 06E.
W71-11439

THE NATIONAL ENVIRONMENTAL SCIENCE TRIANGLE,
Senate, Washington, D.C.
Allen Ellender, Senator.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 1-1 - 1-10.

Descriptors: *Legislation, *Research facilities, *Inter-Agency cooperation, *Institutional aspects, Federal budgets.
Identifiers: Environmental research center, NASA.

The author, Chairman of the Appropriations Committee of the U.S. Senate, describes his efforts toward better coordination among the various research agencies of the government for combating environmental pollution. In 1969 the author proposed that the largely deactivated NASA facilities at Slidell, New Orleans and Picayune, Miss. be converted into an environmental research center. Apart from the savings in time and money, there was unique opportunity of utilizing the Space Agency's special capacities in non-space problems. The availability of this complex, the ability and willingness of NASA to act as host agency, and a ten-million-dollar appropriation for conversion and technological support have helped the movement of several agencies into this complex. The total effect has been to create, within a few months and at relatively little cost, a research facility which would normally have taken several years to put into operation. (See also W71-11441 thru W71-11459) (Ensign-PAI)
W71-11440

AN OVERVIEW AND FORECAST OF FEDERAL REGULATION OF VESSEL DISCHARGES AND SPILLS,
Patton, Blow, Verill, Brand and Boggs.
J. Gordon Arbuckle.
Conference on Pollution Control and the Marine Industry, Ives, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 2-1 - 2-13.

Descriptors: *Legislation, *Waste disposal, *Ships, *Forecasting, Water Quality Act, Water pollution control.
Identifiers: Vessel discharges, Federal regulations, Oil spills.

Recent and potential developments in the area of federal anti-pollution legislation of special interest to the marine industry have been discussed. The major congressional review of the vessel pollution problem came with the Water Quality Improvement Act of 1970. This year, the Congress is considering amendments to this Act and areas such as hazardous substances, port and harbor safety, and

ocean dumping are to receive attention. A number of problems arising from the 1970 legislation, e.g., imprecisely defined terms, conflicting and overlapping federal laws, conflicting state and local laws, and financial responsibility, have been discussed. (See also W71-11440) (Ensign-PAI)
W71-11441

A REVIEW AND PROJECTION OF STATE REGULATIONS OF VESSEL DISCHARGES AND SPILLS,
National Association of Engine and Boat Manufacturers.
Richard D. Snyder.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 3-1 - 3-7.

Descriptors: *Legislation, *Waste disposal, Oil wastes, Water pollution sources, Waste water disposal, Sewage disposal, State governments.
Identifiers: Vessel discharges, State regulations.

In many cases boat pollution laws adopted by one state have little resemblance to those adopted by a neighboring state. The same is true of the anti-pollution devices required by law. The need for uniformity of laws and equipment standards has been presented. (See also W71-11440) (Ensign-PAI)
W71-11442

GULF ENVIRONMENT PROGRAM'S BENEFIT TO THE MARINE INDUSTRY,
Gulf Universities Research Corp.
James M. Sharp.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 5-1 - 5-15.

Descriptors: *Optimum development plans, *Balance of nature, *Environmental effects, Decision making, *Resource development, Natural resources, Cost-benefit analysis.
Identifiers: Gulf states.

Achieving economic development while maintaining environmental quality on a cost effective basis requires a revised scientific approach and a new research management structure. The universities of the five Gulf States and Mexico formed a consortium in 1965 with the aim of developing an organization and scientific manpower required for informed management of the resources and the environment of the Gulf of Mexico. The Gulf Environmental Program is a deterministic total study of the Gulf of Mexico system including waters, life, land, energy budget and circuitry, chemical balances, dynamical exchanges of mass and energy, man's present and cumulative effect upon the system, and the cost-benefit-conservation indices of present and future alternative uses. (See also W71-11440) (Ensign-PAI)
W71-11443

REFUSE ACT OF 1899 PERMIT PROGRAM,
Corps of Engineers, Washington, D.C.
James B. Newman.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 7-1 - 7-6.

Descriptors: *Legislation, *Waste disposal, *Permits, *Pollution abatement, Federal government, *Oil wastes.
Identifiers: Refuse Act of 1899.

The Refuse Act of 1899 makes it unlawful to discharge any refuse matter into the navigable waters of the United States or into their tributaries without first obtaining a permit from the Secretary of the Army or his designated representative. Although the Act has been used frequently to require cessation of harmful discharges and to prosecute violators, the permit provisions of the Act have not been implemented before. The advantages of the program and some of the problems connected with it have been discussed in this paper. (See also W71-11440) (Ensign-PAI)
W71-11444

A NATIONAL OCEAN SURVEY PROGRAM REQUISITE TO POLLUTION RESEARCH AND CONTROL,
National Oceanic and Atmospheric Administration, Silver Spring, Md. Oceanography Div.
R. L. Swanson.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 6-1 - 6-5.

Descriptors: *Ocean circulation, *Tidal effects, *Estuaries, *Currents (Water), Coasts, Forecasting, Pollution abatement.

The National Ocean Survey's new activities in circulation studies are presented. These activities are a part of a larger developing program of the National Oceanic and Atmospheric Administration in estuarine and coastal investigations pertinent to pollution research and control. (See also W71-11440) (Ensign-PAI)
W71-11445

ON SHORE FACILITIES FOR MARINE WASTE DISPOSAL,
American Association of Port Authorities. Environmental Affairs Committee.
Edward Langlois.
Conference on Pollution Control and the Marine Industry, Ives, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 8-1 - 8-10.

Descriptors: *Waste disposal, *Sewage treatment, *Ships, *Waste dumps, *Oil wastes, Pollution abatement, Port authorities.
Identifiers: Vessel discharges.

The role of the Port Authority and Terminal Operator in the task of eliminating the discharge of oily and sanitary waste into the waters has been discussed. Problems connected with receiving stations at the port, floating receiving stations, treatment and disposal of waste, and the matter of financing these facilities have been analyzed and the findings reported. (See also W71-11440) (Ensign-PAI)
W71-11446

PRESENT AND FUTURE INTERNATIONAL AGREEMENTS FOR POLLUTION ABATEMENT AND THEIR IMPACT ON NEW SHIP CONSTRUCTION,
Maritime Administration, Washington, D.C. Office of Ship Construction.
E. Scott Dillion.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 9-1 - 9-29. 10 fig.

Descriptors: *Pollution abatement, *International commissions, *United Nations, *Institutional aspects, *International waters, *Naval architecture, Ships, Forecasting.

Some of the significant international agreements on the ship generated pollution have been discussed. Among the international organizations actively attempting to obtain these multilateral agreements are a number of agencies of the U.N., NATO, and OECD. The agreements on oil pollution abatement and the carriage of dangerous chemicals are expected to substantially affect ship construction. Several basic ship design concepts have been presented to achieve clean ballast operation in cargo ships, containerships, and tankers. (See also W71-11440) (Ensign-PAI)
W71-11447

TECHNOLOGICAL TRENDS IN DETECTION AND CONTROL OF MARINE POLLUTION,
Coast Guard, Washington, D.C. Office of Research and Development.
Charles C. Bates.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 10-1 - 10-11.

Descriptors: *Pollution abatement, *Pollutant identification, *Oil wastes, Coast Guard regulations, Remote sensing, Cleaning.
Identifiers: Oil spill containment.

The role of the U.S. Coast Guard in implementing regulations pertaining to the prevention of marine pollution has been discussed. Among the important responsibilities of the U.S.C.G. in this area are to operate a system of surveillance to insure early notice of oil spills, to develop procedures and techniques for identifying, containing and removing oil, and to provide strike forces of personnel and oil pollution control equipment for carrying out the Contingency Plan. (See also W71-11440) (Ensign-PAI)
W71-11448

FUTURE RESEARCH AND DEVELOPMENT FOR MARITIME POLLUTION PREVENTION AND CONTROL SYSTEMS,
Maritime Administration, Washington, D.C.
Marvin Pitkin.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 11-1 - 11-8.

Descriptors: *Water pollution control, *Pollution abatement, *Planning, *Oil wastes, Data collection, *Engineering, Separation techniques, Ships, Navigation.
Identifiers: Maritime Administration.

The research and development activity of the Maritime Administration can be broadly classified as short-term corrective actions and long-term research in avoiding the causes of pollution. The former currently entails collection of data on ship discharge to develop quantitative criteria and engineering requirements for oily water monitoring and control, development of instrumentation to detect oil-water interface, study of oil concentration profiles in ballast and slop tanks, and development of oily water separators. The long-term research programs aim at elimination of the causes of pollution. Among the projects in this area are the development of advanced collision-avoidance systems, satellite navigation and communication techniques, and human engineering studies. (See also W71-11440) (Ensign-PAI)
W71-11449

U. S. NAVY R AND D EFFORTS IN ENVIRONMENTAL PROTECTION,
Naval Oceanographic Office, Washington, D.C.
Stewart B. Nelson.
Conference on Marine Pollution and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 12-1 - 12-5.

Descriptors: *Water pollution control, *Ships, *Waste disposal, *Research and development, *Sewage treatment, Water Quality Act, Water pollution sources, *Oil wastes.
Identifiers: U.S. Navy, Shipboard wastes.

The Navy is moving rapidly to apply present state-of-the-art solutions to meet the requirements of the existing antipollution legislation. In addition, a significant R and D effort aimed at extending basic knowledge and techniques useful in environmental protection is underway and planned for major expansion during 1972. Apart from finding better

ways for disposal of shipboard wastes and ordnance, this activity would aim at better understanding of the open ocean environment. (See also W71-11440) (Ensign-PAI)
W71-11450

THE COAST GUARD'S RESEARCH AND DEVELOPMENT PROGRAM IN MARINE POLLUTION PREVENTION AND CONTROL SYSTEMS,
Coast Guard, Washington, D.C. Office of Research and Development.
William E. Lehr.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 13-1 - 13-10.

Descriptors: *Water pollution control, *Coast Guard regulations, *Waste disposal, *Ships, *Oil wastes, *Research and development, Water Quality Act, Remote sensing.

The Coast Guard is responsible for enforcing federal antipollution laws on the navigable waters of the United States and for implementing the general vessel safety statutes and maintaining the maritime aids to navigation systems. The research and development activity within the Coast Guard is directed towards providing technical solutions which will eliminate the causes, or reduce the effects, of oil spills. Development of seagoing sewage treatment systems has been given much attention. Currently, a survey of Coast Guard ships and boats is underway to define the scope of exhaust emission problem. Airborne surveillance system and sensor techniques are being developed for oil slick detection. Research in prevention of accidental oil spills is being directed towards improved ship construction standards and ship positioning systems. (See also W71-11440) (Ensign-PAI)
W71-11451

NAVAL SHIPBOARD WASTES, FUTURE SYSTEMS FOR THEIR TREATMENT AND DISPOSAL,
Naval Ship Engineering Center, Hyattsville, Md.
Edward T. Kinney.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 14-1 - 14-29.

Descriptors: *Waste disposal, *Ships, *Water pollution sources, *Sewage treatment, *Oil wastes, Water Quality Act, Research and development.
Identifiers: Shipboard wastes.

Sewage, oil, solid wastes, industrial chemicals, and combustion by-products are among the environmental pollutants discharged by naval ships. Implementing control measures within the constraints imposed by the military ship environment makes the problem unique. Programs for developing control equipment for sewage and oil are well underway. The scope of the problem and the shipboard constraints have been defined. The concept of integrated ship disposal systems have also been explored. (See also W71-11440) (Ensign-PAI)
W71-11452

LOUISIANA FISHERIES RESOURCES POLLUTION PROBLEMS AND RECOMMENDED SOLUTIONS,
Louisiana State Univ., Baton Rouge.
Leslie L. Glasgow.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 15-1 - 15-6.

Descriptors: *Louisiana, *Fisheries, *Water pollution sources, *Oil wastes, *Water pollution effects, Gulf of Mexico, Mississippi River, Oil wells, Balance of nature.

The pollution load of the Mississippi River is a constant threat to the fisheries resources in the Gulf and particularly along the Louisiana coastline. Due to the peculiar geography of this coast a blowout on a multiple well platform during a major hurricane can have disastrous consequences for several hundred thousand acres of low marshland. Among the every day pollution problems are the chronic spills from tankers and barges, waste disposed by thousands of sport and commercial boats, and garbage and debris dumped from platforms. (See also W71-11440) (Ensign-PAI)
W71-11453

WASTE MANAGEMENT SYSTEMS FOR RECREATIONAL AND COMMERCIAL VEHICLES,
Environmental Protection Agency, Wash., D.C.
Harold Bernard.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 18-1 - 18-18.

Descriptors: *Waste disposal, *Ships, *Water Quality Act, *Water pollution sources, *Oil wastes, Waste treatment, Waste storage, Water pollution control.
Identifiers: *Shipboard waste.

The shipboard waste characteristics and the total contribution of shipboard waste discharges to the overall problem of water quality control have been examined. Vessel waste holding and treatment systems, and treatment and discharge systems have been presented. The research and development activity of the Environmental Protection Agency in this area has also been outlined. (See also W71-11440) (Ensign-PAI)
W71-11454

THE ROLE AND MISSION OF THE EPA REGIONAL OFFICE,
Environmental Protection Agency, Wash., D.C.
Jerry T. Thornhill.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 19-1 - 19-4.

Descriptors: *Administrative agencies, *Federal government, *State governments, *Regulation, Institutional aspects, Water pollution control, Air pollution, Solid wastes, Radiation, Pesticides.
Identifiers: Regional offices, Environmental Protection Agency.

The EPA brings under one administrative structure the major environmental protection programs of the Federal government. These programs involve broad responsibilities for research, standard setting, monitoring, and enforcement in the areas of air and water pollution, solid waste, radiation, and pesticides. By establishing EPA on the basis of strong regional system, it is hoped that state and local governments will have the opportunity for maximum participation in planning and execution of programs. (See also W71-11440) (Ensign-PAI)
W71-11455

ANALYSIS AND FORECAST OF THE MARINE POLLUTION CONTROL MARKET,
Technical Marketing Associates.
Joseph S. Ives.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 21-1 -21-8.

Descriptors: *Forecast, *Water pollution control, *Equipment, *Marketing, Ships.

The marine pollution control market is made up of equipment required to detect, measure, dispose of, prevent and clean up pollutants. The customers for this equipment will be the U.S. Government, the offshore industry, the marine transportation industry, the fishing industry, and the recreational boating industry. Tighter standards will generate requirements for new pollution control equipment which should total $3.8 billion by 1976. (See also W71-11440) (Ensign-PAI)
W71-11456

THE NATIONAL MARINE FISHERIES SERVICE AND ITS ROLE IN THE PREVENTION AND CONTROL OF POLLUTION,
National Oceanic and Atmospheric Administration, Silver Spring, Md.
Ernest D. Premetz.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 16-1 - 16-5.

Descriptors: *Fisheries, *Water pollution effects, *Federal government, *Aquatic environment, Institutional aspects, Regulation, Research and development, Water pollution control.
Identifiers: National Marine Fisheries Service.

One of the primary functions of the National Oceanic and Atmospheric Administration and its National Marine Fisheries Service is to provide the knowledge and understanding of the processes of the marine environment, both physical and biological, needed for development of effective regulations by other agencies of the Federal government. The research activity is being focused on the physiological effects of the pollutants on the fishery resources. (See also W71-11440) (Ensign-PAI)
W71-11457

MARINE POLLUTION LIABILITY INSURANCE,
American Institute of Marine Underwriters.
John D. Barry.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 22-1 - 22-5.

Descriptors: *Insurance, *Ships, *Water pollution control, *Damages, *Oil wastes, Cleaning, Water Quality Act.
Identifiers: Pollution liability insurance.

With the passage of the Water Quality Improvement Act of 1970, the underwriters found themselves facing the costs of cleaning up waters polluted by the vessels. The Act included two unusual conditions - liability without fault and direct action against the underwriters. Pollution liability insurance is now being written to provide the insured coverage and to provide sufficient proof of financial responsibility, both required by the Act. American Marine Underwriters are currently in the process of organizing a pool to provide greater coverage at lower costs. (See also W71-11440) (Ensign-PAI)
W71-11458

COASTAL STATES ORGANIZATION'S PROGRAM TO DEVELOP REGIONAL POLLUTION PREVENTION/CONTROL STANDARDS AND ACTIVITIES,
Coastal States Organization.
Thomas H. Suddath.
Conference on Pollution Control and the Marine Industry, sponsored by the International Association for Pollution Control, New Orleans, April 1-3, 1971, p 20-1 - 20-4.

Descriptors: *State governments, *Interstate, *Regulation, *Standards, *Pollution abatement, Institutional aspects, Pollutants, Water pollution control.
Identifiers: Coastal states.

In the task of environmental protection the Coastal states have much in common. They are concerned with fresh water management, management of

mineral deposits within the coastal zone, including petroleum and natural gas, management of the coastal marshlands, wet lands and the estuarial waters, and the management of the recreation areas. The Coastal States Organization is a group of representatives from coastal and great lake states. The organization aims at communications among member states on matters of mutual interests and injection of state interests into national legislation activities. (See also W71-11440) (Ensign-PAI)
W71-11459

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 06E.
W71-11462

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 06E.
W71-11503

ORGANIZATIONAL FRAMEWORK OF STATE AND REGIONAL WATER POLLUTION CONTROL BOARDS.
California Water Resources Control Board, Sacramento.

Administrative Procedures Manual, California Water Resources Control Board, Sacramento, Calif, p 1-13, A1-B3 (1970). 21 p, 1 fig, 1 chart, 2 append.

Descriptors: *California, *Regulation, *Water pollution control, *Administrative agencies, Administration, Pollution abatement, State governments, Local governments, Legal aspects, Standards, Inspection, State jurisdiction, Permits, Public health, Project planning, Water quality control, Adoption of practices.

This manual details the administrative framework within which the California Water Pollution Control Board is to operate. Included herein are specifications of the responsibilities of the board chairman, vice chairman, and board members; the Water Quality Advisory Committee; and the Executive Coordinating Committee. Procedures prescribed for regional water pollution control boards include specifications as to the responsibilities of the board, the board chairman, the vice chairman, and the executive officer. Each regional board must appoint an executive officer subject to qualifications established by the State Board. Procedural guidelines are also set forth for the executive officer as to board staffing and personnel requirements. The regional board's legal representative is designated as the Chief Council of the State Water Resources Control Board or his designee. Such council must be present at all meetings and hearings to assist boards in effectively implementing water quality laws. Procedures set forth governing meetings and hearings deal with the scheduling of meetings, meeting objectives, agenda forms, agenda information and executive officer's summary reports, minutes, meeting procedures, and procedures in the absence of a quorum. Also included are forms of communication and staff management guidelines. (Horwitz-Florida)
W71-11510

ENFORCEMENT (WATER QUALITY REQUIREMENTS).
California Water Resources Control Board, Sacramento.

Administrative Procedures Manual, California Water Resources Control Board, Sacramento, Calif, p 23-34, D1-E3 (Rev 1971). 24 p, 2 append.

Descriptors: *Water quality control, *California, *Water pollution control, *Administration, Regulation, Supervisory control (Power), Pollution abatement, Administrative agencies, State governments, State jurisdiction, Standards, Inspection, Legal aspects, Permits, Water allocation, Water pollution, Waste treatment, Waste water treatment, Sewage treatment.

Administrative enforcement actions by the California Water Quality Control Board are herein enumerated and include the issuance of: (1) time schedules for compliance, (2) cease and desist orders, (3) cleanup orders, and (4) notice of violations on nonoperating industry or business sites. Procedures for each administrative enforcement technique are set forth along with an explanation of the proper use of time schedules and forthwith commands in a cease and desist order. The manual next details prohibitions and restrictions on additional connections to community sewer systems. Each discharger should take immediate corrective action to achieve rapid compliance with the Board's orders. If the discharger does not so comply and immediate cleanup is necessary, the Board may request the appropriate agency to clean up or abate said waste and charge all costs to the discharger. Administrative procedures are also herein established for: (1) cease and desist hearings, (2) inspection powers of regional boards, (3) civil judicial enforcement, and (4) criminal judicial enforcement. Forms to be utilized in such proceedings are contained in the attached appendixes. (Horwitz-Florida)
W71-11522

WATER QUALITY CONTROL PLANS.
California Water Resources Control Board, Sacramento.

Administrative Procedures Manual, California Water Resources Control Board, Sacramento, Calif, p 35-40 (1970). 6 p.

Descriptors: *California, *Water quality control, *Administrative agencies, *Long-term planning, Regulation, State governments, State jurisdiction, Administration, Pollution abatement, Supervisory control (Power), Legal aspects, Inspection, Permits, Water policy, Sewage disposal, Sewage treatment, Water pollution, Water treatment, Water pollution control, Water conservation, Water resources, Regional analysis, Planning, Standards, Water management (Applied).

This manual details the procedures to be followed by regional and state boards when establishing water quality control plans. The purposes of such plans are to: (1) meet state and federal regulations and grant provisions, (2) provide a framework for effective basin management, (3) present guidelines for management of the basin to achieve wise use of water resources, (4) provide detailed guidance for the control of waste disposal, (5) serve as supporting documentation by boards for the issuance of discharge prohibitions, and (6) provide the basis for limiting constituent concentrations in each waste discharge. Water quality control plans must include descriptions of the: area, uses of water, water quality objectives, water inventory, basin water quality system, master sewerage plan, special problems in water resource control, and implementation schedule. The manual describes procedures that must be followed in preparing and conducting public hearings in which water quality plans are considered. Guidelines for plan adoption are established along with procedures for the modification of water quality plans. (Horwitz-Florida)
W71-11542

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 06E.
W71-11547

A BILL TO PROHIBIT DISCHARGE OF ANY MILITARY MATERIAL OR OTHER REFUSE INTO NAVIGABLE WATERS OF THE UNITED STATES OR INTO INTERNATIONAL WATERS, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W71-11550

A BIOLOGICAL APPROACH TO WATER QUALITY MANAGEMENT,
For primary bibliographic entry see Field 05C.
W71-11579

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, TO PROVIDE FINANCIAL ASSISTANCE FOR RIVER BASIN PROGRAMS.
For primary bibliographic entry see Field 06E.
W71-11584

THE LEGAL AND ECONOMIC ASPECTS OF POLLUTION,
Chicago Univ., Ill. Center for Policy Study.
George Anastaplo, Stephen R. Berry, Ronald H. Coase, Harold Demsetz, and Milton Friedman.
1970, 37 p.

Descriptors: *Pollution abatement, *Economics, *Legal aspects, *Cost-benefit analysis, Water pollution control.

A panel discussion among University of Chicago faculty members is presented. Economic cost-benefit analysis is the general approach of the panelists to the problems of pollution. To have unpolluted air and unpolluted water, etc., a person must be willing to assume a cost upon himself, and not expect that others will assume the cost for him. Some of the questions that are involved in the cost-benefit analysis approach are: What is the value of the cost of not having pollution. How much of a cost are people willing to submit to for achievement of pollution abatement. Who benefits from the cost spent for pollution abatement. Who pays for the cost. There is discussion of these questions in terms of the University of Chicago's stockholder position in Commonwealth Edison. (Strachan-Chicago)
W71-11608

CONTEMPORARY WATER TANKS – ESTHETICS WITH FUNCTION,
Washington Dept. of Public Works and Utilities, Spokane.
Richard E. Saty.
Public Works, Vol 102, No 7, p 52-53. July 1971, 4 photo.

Descriptors: *Reservoirs, *Reservoir storage, *Water tanks, *Water supply, Structural design, Washington.
Identifiers: *Spokane (Wash), *Esthetics.

The construction in Spokane, Washington of a low system storage reservoir to replace the old reservoir where the water was purified by sunlight is discussed. Every effort was made on the part of the Department of Public Works, which created the reservoir design, to take into account the esthetical and functional needs of the community. As a result, the reservoir does not destroy the beauty of its park surroundings and at the same time it maintains the quality of the water for the city of Spokane. (Strachan-Chicago)
W71-11611

LAWS AND REGULATIONS RELATING TO WATER POLLUTION CONTROL AFFECTING THE DISTRICT OF COLUMBIA,
District of Columbia Dept. of Public Health, Washington, D.C. Gov't of the District of Columbia, Washington, D.C., Dept. of Public Health.
P. Flaherty, and G. M. Thornett.
June 1967, 336 p, 33 ref, 6 append.

Descriptors: *District of Columbia, *Water pollution control, *Water quality control, *Pollution abatement, Federal government, Legislation, Regulation, Water pollution, Water quality, Water resources, Water resources development, Water policy, Water law, Legal aspects, Grants, Adminis-

tration, Administrative agencies, Administrative decisions.

A complete compilation of all water pollution control laws and regulations affecting the District of Columbia is provided by this volume, with compendious explanations of or commentaries on the application of each statute and regulation. Federal statutes relating directly to water pollution abatement, prevention, and control are discussed. The applicable federal regulations are also provided. Statutes and regulations on water pollution control specifically applicable to the District of Columbia are next provided. Lastly a summary of relevant interstate compacts and regional and local water pollution control laws and regulations is presented. (Robinson-Florida)
W71-11615

INTERNATIONAL CONTROL OF MARINE POLLUTION,
N. A. Wulf.
The JAG Journal, Vol 25, No 3, p 93-100, 1971, 8 p, 52 ref.

Descriptors: *Water pollution sources, *International waters, *Oil wastes, *Ships, Discharge (Water), Water pollution, Water pollution effects, Water pollution control, Bodies of water, Admiralty, Water rights, Legal aspects, Organizations, Treaties, Governments, Federal jurisdiction, Legislation, Remedies, Damages, International commissions, International law.

This article discusses the existing programs and multilateral agreements formulated to control oil pollution in territorial and international waters. The effects and control of non-casualty discharges are discussed by examining the coverage of and inadequacies in the 1954 Convention for the Prevention of Pollution of the Sea by Oil. The problems with the Convention include: (1) impedance of detection and proof by the vastness of the prohibited zone, (2) difficulty of prosecution, and (3) lack of enforcement by the flag state. Solutions proposed by the Intergovernmental Maritime Consultative Organization are abolition of all prohibited zones and prohibition of discharges of oil unless under a specified exception. Detection of unlawful discharge remains the key problem. Casualty discharges are reviewed in the context of recent United States legislation regulating pollution hazards occurring in territorial waters. Recent multilaterial legislation provides measures for any nation to prevent and mitigate serious imminent pollution from a maritime casualty that may affect coastlines, estuarine areas, tourist attractions, or conservation areas. The difficulty in obtaining adequate compensation when liability can be imposed has led to recent programs of marine insurance whereby oil tankers may limit their liability. (Rees-Florida)
W71-11616

STATEWIDE STANDARDS AND CRITERIA FOR MANAGEMENT OF SHORELAND AREAS OF MINNESOTA.
Minnesota Regulations, Dep't of Conservation, ch 6, 1970, 40 p.

Descriptors: *Minnesota, *Water pollution sources, *Land use, *Environmental engineering, Planning, Regulation, State governments, Local governments, Water policy, Administrative agencies, Water law, Public health, Environmental effects, Environmental sanitation, Social aspects, Water pollution control, Water quality control, Zoning, Land development, Land resources, Natural resources, Water resources, Standards, Economics, Water utilization.

The uncontrolled use of shorelands adversely affects the public health, safety and general welfare by contributing to pollution of public waters. The purpose of these regulations is to provide the counties of the state with minimum standards and criteria for the subdivision, use, and development of the shorelands of public waters located in unincorporated areas and thus preserve and enhance the quality of surface waters, conserve the economic and environmental values of shorelands, and provide for the wise utilization of water and related land resources of the state. These regulations govern: (1) classification of public waters, (2) acceptable type and placement of sanitary and waste disposal facilities in shoreland areas, (3) size and length of water frontage of lots suitable for building sites, (4) placement of structures in relation to shorelines and roads, (5) alteration and preservation of the natural landscape, (6) subdivision of shoreland areas, and (7) variances from the minimum standards and criteria. A Model Ordinance is provided as an illustration of the form and subject matter which the counties should consider in adopting shoreland management ordinances. (Johnson-Florida)
W71-11617

LEGAL ASPECTS OF A FEDERAL WATER QUALITY SURVEILLANCE SYSTEM,
Jon T. Brown, and Wallace L. Duncan.
Michigan Law Review, Vol 68, p 1131-1166, 1970, 36 p, 142 ref, append.

Descriptors: *Water quality, *Federal government, *Inspection, *Water quality control, Legal aspects, Administrative agencies, Real property, Land tenure, Water Quality Act, Legislation, Local governments, State governments, Condemnation, Navigation, Federal reservations, Interstate compacts, Interstate commissions, Standards, Investigations, Data collections, Pollutant identification, Sampling, Federal jurisdiction.
Identifiers: *Water Pollution Control Act.

Enforcement of water quality standards is inhibited by the absence of a system for measuring pollution and detecting polluters. A Federal Water Quality Surveillance System would fill this need. Federal authority over navigable waters and the commerce power provide adequate constitutional authority. The Federal Water Pollution Control Act provides ample statutory authority to create a surveillance system to be employed in conjunction with interstate pollution control agencies. The system's success may depend upon the selection of suitable sites. Sites may, alternatively, be established on riparian land without compensation, under navigational servitude, or established on: (1) public domain lands; (2) national forest lands; (3) Bureau of Reclamation project sites; or (4) Corps of Engineers project sites. Mere federal ownership does not guarantee site availability. Statutory, interdepartmental, and intradepartmental obstacles may arise. Sites may also be acquired from states, municipalities, or private owners by donation, exchange, purchase, or condemnation. Nevertheless, the Water Quality Improvement Act does not appear to provide the necessary authority for site acquisition. Although its greatest contribution would be the detection of polluters, a surveillance system should provide data which will satisfy the evidentiary requirements of enforcement proceedings. (Hart-Florida)
W71-11618

ENVIRONMENTAL FINANCING ACT OF 1970 (A BILL TO ESTABLISH AN ENVIRONMENTAL FINANCING AUTHORITY TO ASSIST IN THE FINANCING OF WASTE TREATMENT FACILITIES, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W71-11619

CLEAN WATER FINANCING ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, TO PROVIDE FINANCIAL ASSISTANCE FOR THE CONSTRUCTION OF WASTE TREATMENT FACILITIES, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W71-11620

A BILL TO AMEND THE PUBLIC HEALTH SERVICE ACT TO PROHIBIT THE DISCHARGE OF ELEMENTAL MERCURY AND ITS COMPOUNDS INTO THE NAVIGALBE WATERS OF THE UNITED STATES.
For primary bibliographic entry see Field 06E.
W71-11621

A BILL TO PROVIDE FOR CONSTRUCTION OF CONTAINED DREDGED SPOIL DISPOSAL FACILITIES FOR THE GREAT LAKES AND CONNECTING CHANNELS, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W71-11622

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO INCREASE THE PENALTY FOR POLLUTION OF THE WATER BY OIL.
For primary bibliographic entry see Field 06E.
W71-11623

POLLUTION,
Leslie E. Mack.
In: Water Law in Arkansas, Arkansas Industrial Research and Extension Center, Univ. of Arkansas, Little Rock, p 35-36, 39-41, 1963, 5 p, 17 ref.

Descriptors: *Arkansas, *Water pollution control, *Water policy, *Administration, Judicial decisions, State governments, State jurisdiction, Administrative agencies, Standards, Regulation, Permits, Remedies, Damages, Water quality control, Water pollution sources, Legal aspects, Supervisory control, Waste treatment, Water conservation, Project planning, Water allocation, Water resources, Water pollution.

The approach taken by Arkansas courts in the field of pollution control has been to permit an injured party to recover damages caused by the pollution or to have the action enjoined as a nuisance. Pollutants involved in cases which have been appealed to the Arkansas Supreme Court include creosote, washings from sand and gravel plants, mud tailings from open-pit mines, seepage from hog pens, deleterious chemicals, salt water, and municipal sewage. Judgments in cases concerning private parties indicate a consistent approach to pollution abatement, but this consistency is lacking when the court deals with cities and sewer districts. The thrust of pollution abatement activity has shifted from private suits to corrective actions by state agencies. The jurisdiction and duties of the various state agencies dealing with pollution are considered. The agencies considered include: (1) the state board of health, (2) the water pollution control commission, and (3) the state game and fish commission. (Horwitz-Florida)
W71-11624

WATERS AND WATERCOURSES--POLLUTION--ACCRUAL OF CAUSE OF ACTION.
Minnesota Law Review, Vol 21, p 117-118, 1937, 2 p.

Descriptors: *Kansas, *Natural flow doctrine, *Reasonable use, *Remedies, Natural use, Natural flow, Water pollution, Waste disposal, Damages, Judicial decisions, Legal aspects, Riparian rights, Riparian waters, Riparian land, Water utilization.

A plaintiff need not prove damages to his land in order to maintain an action of trespass, but in an action on the case he must prove that he suffered actual damages. An action at law for a nuisance is customarily an action on the case. Some courts treat water pollution as a nuisance, and a cause of action does not arise unless the plaintiff suffers damages and the pollution is caused by defendant's unreasonable use of the stream. Therefore, under the reasonable use doctrine, the plaintiff's cause of action accrues when he can show that the defendant's use of the stream was unreasonable or

caused material damage to plaintiff's land. Some courts, however, treat water pollution as a violation of the lower riparian owner's natural right to an unpolluted flow of water. Under this natural right theory a plaintiff's rights are violated by any unreasonable impairment of the quality of the stream, at which time a cause of action arises even though plaintiff has suffered no damage. (Shelnut-Florida)
W71-11625

JOINT LIABILITY OF INDEPENDENT WRONGDOERS FOR POLLUTION OF WATER COURSE.
Minnesota Law Review, Vol 11, p 386-387, 1927, 2 p.

Descriptors: *Minnesota, *Water pollution, *Sewage disposal, *Damages, Waste disposal, Rivers, Judicial decisions, Legal aspects, Remedies.

If a number of persons contribute to the pollution of a stream, creating an actionable nuisance, the parties are usually not held jointly liable in the absence of a concert of action or a common design or purpose. However, such wrongdoer is liable for the proportion of the damage attributable to his actions. The tort in such cases is the original obstruction of the water course or the discharge of the refuse into the stream, and the acts of the wrongdoers, being separate when committed, cannot impose a joint liability merely by virtue of the union of consequences. However, joint liability is imposed when a plaintiff's injury is caused by the concurrence of the acts of several wrongdoers, where the acts of any one of them, standing alone, would have caused no injury. In such a case any one of the wrongdoers may be liable for the whole injury. Furthermore, if the acts are regarded as independent torts, each of which causes some injury, the concert of action necessary to render the wrongdoers jointly liable properly may be implied from the continuance of the wrongful acts after the wrongdoers had knowledge of the injury resulting to the plaintiff. (Shelnut-Florida)
W71-11626

WATER POLLUTION CONTROL IN MISSISSIPPI,
Roger T. Clark.
Mississippi Law Journal, Vol 41, p 351-359, 1970, 9 p, 59 ref.

Descriptors: *Mississippi, *Water pollution control, *Remedies, *Pollution abatement, Water quality control, Water pollution, Damages, Riparian land, Riparian waters, Riparian rights, Legislation, Judicial decisions, Legal aspects, State governments, Administrative agencies, Administration, Permits, Standards, Water Quality Act.

This article discusses the legal methods, both common law and statutory, which can be used to control or abate water pollution in Mississippi. Under the common law the action usually brought to have pollution abated is based on the theory of nuisance; and, as a general rule, only riparian owners are entitled to relief. The relief granted in private actions is in the form of damages, injunctive relief or criminal prosecution. In an action for damages, the relief granted may include any or all of the three types of damages: compensatory, punitive, or special. If the injury to land is permanent, the proper measure of damages is the difference between the market value before and after the injury. If, however, the injury is temporary, the measure of damages is determined by the land's rental value. The balancing of injurie doctrine is the prime factor in determining whether or not an injunction would be granted. One who pollutes a watercourse is subject to criminal prosecution where the pollution constitutes a public nuisance or contravenes a statute. Under Mississippi pollution control law, a commission is authorized to adopt quality standards and issue permits. (Shelnut-Florida)
W71-11628

PRIORITIES FOR DEVELOPING LEGAL AND ECONOMIC RESEARCH ON WATER PROBLEMS,
For primary bibliographic entry see Field 06E.
W71-11630

A CHALLENGE TO THE CALIFORNIA WATER PLAN,
Joseph M. Fioravanti.
Hastings Law Journal, Vol 22, No 3, p 732-758, 1971, 27 p, 217 ref.

Descriptors: *California, *Water resources development, *Water pollution control, *Interbasin transfers, Water resources, Water pollution, Water quality, Water quality control, Legislation, Legal aspects, Water law, State governments, Federal government, Engineering, Engineering structures, Environmental effects, Water conveyance, Water supply, Water transfer, Equitable apportionment, Water allocation (Policy), Water requirements, Rivers and Harbors Act.

The harmful effects of the California Water Plan are discussed in this article, in which the geographical and historical origins of the Plan are presented. Adverse consequences of interbasin water transfers such as those implemented by the Plan affect anadromous fishery resources, water temperature, salinity incursion, marshland, and the San Francisco Bay. State preservation of source areas is discussed in terms of watershed protection, California water quality control, and stored water resources. Applicable federal legislation, such as the Rivers and Harbors Act of 1899, the National Environmental Policy Act of 1969, and the Federal Water Pollution Control Act as amended by the Water Quality Improvement Act of 1970, is discussed. Federal fish and wildlife protection, federal water pollution control, and related federal conservation legislation are examined. Water flow regulation is also examined. The author concludes that both the Rivers and Harbors Act and the National Environmental Policy Act could be used to limit further expansion of the California Water Plan. He recommends that development of the Plan be postponed until its environmental consequences are fully evaluated and the appropriate measures are taken to correct its deficiencies. (Robinson-Florida)
W71-11632

RULES AND REGULATIONS COVERING DISPOSAL OF WASTES FROM WATERCRAFT.
Texas State Dept. of Health, Austin.

1966, 2 p.

Descriptors: *Texas, *Standards, *Boating regulations, *Sewage disposal, Regulation, State governments, Supervisory control (Power), Administrative agencies, Pollution abatement, Public health, Boats, Legal aspects, Recreation, Water pollution, Water quality, Sewage treatment, Waste disposal.

The purpose of these waste disposal regulations is to prescribe methods and procedures for the construction and operation of marine toilet devices for use on watercraft. The authority for the rules and regulations is stated by citing various statutes concerning the state department of health and its powers and duties in this area. Definitions of important terms are put forth, including: boat, marine toilet, other disposal units, holding tank, waters of the state, and septic action. The rules covering sewage disposal devices and equipment are next considered in detail. Every marine toilet shall have securely affixed to its discharge outlet a holding tank located on the boat which shall be: (1) constructed so as to prevent the removal of sewage except by pumping at onshore facilities, (2) constructed of material which will withstand the corrosive effects of sewage and disinfecting chemicals, and (3) properly vented to the outside of the boat. The contents of the tank shall be discharged only to onshore facilities constructed so as to prevent pollution. (Horwitz-Florida)
W71-11633

CERTIFICATION OF CONFORMANCE WITH WATER QUALITY STANDARDS.
California Water Resources Control Board, Sacramento.

Administrative Procedures Manual, p 41-44, F1-4, 1970, 8 p, append.

Descriptors: *California, *Administration, *Permits, *Water pollution control, State governments, Federal government, Regulation, Standards, Administrative agencies, Supervisory control (Power), Pollution abatement, Treatment facilities, Waste treatment, Waste water disposal, Legal aspects, Water pollution treatment, Control systems.

Determination is made by the concerned federal agency of those activities for which certification under federal law is required. The Water Resources Control Board, however, is responsible for acting on applications for such certificates. Applications for certification shall include: (1) the name and address of the applicant, (2) a description of the activity for which certification is sought, (3) the address and a site map of the location of the activity, (4) a description of the effect of the activity in terms of quantity and quality of waste discharge, and (5) dates of construction and operation of the activity. Regional staff and state board procedures, as well as time limits are also specified. An example of a Notice of Request for State Certification is provided in an appendix, along with a sample certificate of conformance. (Horwitz-Florida)
W71-11634

FINANCIAL ASSISTANCE PROGRAMS (GRANT APPLICATION PROCEDURES).
California Water Resources Control Board, Sacramento.

Administrative Procedures Manual, p 14-16, 1970, 3 p.

Descriptors: *California, *Regulation, *Grants, *Water pollution control, Government finance, State governments, State jurisdiction, Administration, Administrative agencies, Financial feasibility, Financing, Planning, Project planning, Participating funds, Loans, Pollution abatement, Water quality control, Treatment facilities.

Procedures are herein established concerning obtainment of all state and federal grants relating to water pollution control by California water resource control boards. The State Board is responsible for submitting comments to the State Clearinghouse on all Notices of intent to File for federal grants. Federal construction grant administration is regulated in detail by California statute. Such grants are jointly administered by the State and regional boards. The regional boards must assign priority groupings for water control needs for the processing of construction grant applications. Each application must be assigned according to its priority. Regional boards forward the assignment and a precertification report, filed by the applicant, to the Division of Water Quality. Procedures are also established for the regional processing of Water Quality Control Fund loans. Federal Water Pollution Control Research and Development Grant applications are filed directly with the Federal Water Quality Administration. The Administration then forwards a copy to the State Board for review. The procedures for handling such applications after receipt by the State Board are also enumerated. Procedures for handling Federal Comprehensive Planning grants are also established. (Horwitz-Florida)
W71-11635

QUALITY CONTROL AND RE-USE OF WATER IN CALIFORNIA,
Adolphus Moskovitz.
California Law Review, Vol 45, p 586-603, 1957, 18 p, 110 ref.

Descriptors: *Water quality control, *Administrative agencies, *Appropriation, *Water reuse, Recirculated water, Water utilization, Standards, Competing uses, Consumptive use, Water rights, Watershed management, Water shortage, Water supply, Reclaimed water, Reclamation, Return flow, Waste water (pollution), Water allocation (Policy), Water demand, Water transfer, Water contracts, Preferences (Water rights).

The maldistribution of water resources in California has required transporting water between areas and caused resource management authorities to emphasize preservation of water quantity. With the expanding economy and population, however, the reuse of water has shifted the emphasis to water quality. Primary responsibility for water quality control is vested in nine regional control boards; meanwhile the Health Department is responsible for health hazards. Pollution is not subject to abatement unless it results from sewage or industrial waste disposal, and pollution exists only where unreasonable harm results. The regional boards issue discharge requirements; if the waste assimilative capacity of the water absorbs the pollution so that the requirements are not exceeded, the discharge is not subject to abatement. The State Water Pollution Control Board is empowered to formulate statewide policy. The appropriation doctrine is subject to two exceptions arising from 'foreign water' (imported from another watershed): (1) foreign water may not be taken under a riparian right; and (2) an appropriator of foreign water cannot compel continued discharge. Furthermore, an appropriator may reclaim and re-use water; thus a city may reclaim water within its boundary, treat it, and re-use it. Waste water thus reclaimed may also be sold, materially affecting the quantity of water available for re-use. (Hart-Florida)
W71-11636

CONTROL OF STREAM POLLUTION,
Boyd D. Taylor.
Texas Law Review, Vol 33, p 370-384, 1955, 15 p, 77 ref.

Descriptors: *Texas, *Water pollution control, *Administrative agencies, *Pollution abatement, Legislation, Adjudication procedure, Legal aspects, Judicial decisions, Cities, Sewage disposal, Water pollution, Water pollution sources, Remedies, Water quality, Water quality control, Administration, Industries, Industrial wastes, Riparian rights, Appropriation, Rivers, Streams, Saline water, Regulation.

Water pollution is a serious problem in Texas, as in other states. Although the riparian and appropriation doctrines treat pollution similarly, a mere interloper has disposal rights substantially different from those of persons acquiring their disposal rights through either the riparian or appropriation doctrines. In jurisdications strictly enforcing the riparian doctrine, only riparians have an interest in the water, and others cannot obtain relief from pollution. A similar doctrine applies to appropriators. Injunction to prevent future injury and damages for past injury are the primary remedies available to a party injured by pollution. Various procedural limitations, such as joining necessary parties, the proper theory of the action, and joint tortfeasors, however, lessen the impact of these remedies. Public control of water pollution in Texas is vested in the State Department of Health, which shares its responsibility with local governments. A balancing approach has been applied by the courts of Texas in dealing with pollution caused by municipal sewage disposal. Salt water pollution, conversely, is strictly regulated. More effective pollution control in Texas could be achieved by organizing this patchwork of legislation and creating a central authority for pollution control. (Hart-Florida)
W71-11637

RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS.
Nebraska Water Pollution Control Council, Lincoln.

Nebraska Water Pollution Control Council, Lincoln, Neb, nd, 2 p.

Descriptors: *Nebraska, *Water pollution control, *Waste disposal, *Domestic animals, Legislation, Feeds, Water pollution sources, Water policy, Administrative agencies, Regulation, Programs, Standards, Streams, Rivers, Pollution abatement, Administration, Cattle, Poultry, Water fowl, Animals, Legal aspects, Waste disposal, Farm wastes.

The Nebraska Water Pollution Control Council is empowered to effectuate a comprehensive program of water pollution control. Feedlot registration is a necessary portion of an overall waste disposal inventory. For clarity in implementing this Regulation, the word 'feedlot' is defined as the confined feeding of food, fur, or pleasure animals in buildings, lots, or ponds not normally used for raising crops or grazing animals. The confined feeding of enumerated animals, when grouped in numbers herein specified, shall come under this regulation. Any confined feeding within 500 feet of any watercourse also comes within the provisions of the Regulation. Registration of existing feedlots, prior to July 1, 1968, and proposed feedlots, at least sixty days prior to construction, is mandatory. Such registration must be accomplished on forms supplied by the Council. Detailed information must be provided on each feedlot. A failure to register is made punishable by statutory penalties. (Rees-Florida)
W71-11638

RULES AND REGULATIONS CONCERNING STATE CERTIFICATION TO APPLICANTS FOR FEDERAL LICENSES OR PERMITS TO CONDUCT ACTIVITIES ON NAVIGABLE WATERS OF THE UNITED STATES FLOWING THROUGH OR BORDERING THE STATE OF NEBRASKA.
Nebraska Water Pollution Control Council, Lincoln.

1970. 4 p.

Descriptors: *Nebraska, *Navigable waters, *Water permits, *Administrative agencies, Regulation, Water policy, Water law, Water Quality Act, Water quality control, Navigation, Impaired water quality, Water pollution control, Legislation, Statutes, Standards, Decision making, Legal aspects, United States.

Prior to initiation of any activity on navigable waters flowing through or bordering Nebraska, certification is required from the Nebraska Water Pollution Control Council that there is reasonable assurance the proposed activity will not violate the Water Quality Standards Applicable to Nebraska Waters. Applications for certification shall be accompanied by engineering reports and other pertinent data and filed with the Council. Notice of filing shall be in newspapers in the county where the activity will occur. Final determination shall be within 90 days. Public hearings are required when ordered by the Council or requested by an applicant upon receipt of written objection within 30 days from publication of the notice of filing. If a hearing is held, the 90 day period is extended an additional 15 days. Failure of the Council to grant or deny an application within 90 days validates the application. The sole criterion for certification is a reasonable assurance that the activity will not violate the Water Quality Standards Applicable to Nebraska Waters pursuant to the Nebraska Water Pollution Control Act. (Rees-Florida)
W71-11639

DESIGN CRITERIA FOR SEWERAGE SYSTEMS.
Texas State Dept. of Health, Austin. Division of Waste water Technology and Surveillance.
For primary bibliographic entry see Field 05D.
W71-11640

WATER POLLUTION CONTROL LAWS OF OREGON--PROBLEMS OF ENFORCEMENT,
Cecil H. Quesseth.
Willamette Law Journal, Vol 3, p 284-294, 1965. 11 p, 32 ref.

Descriptors: *Oregon, *Water pollution control, *Administrative agencies, *Water quality control, Standards, Waste disposal, Treatment facilities, Cities, Chlorination, Sewage effluents, State governments, Legislation, Judicial decisions, Legal aspects, Remedies, Administration, History.

Oregon's water pollution control laws are analyzed through a review of the history of such laws prior to 1939, the 1939 initiative laws establishing the State Sanitary Authority, and the present law. Prior to 1939, water pollution control legislation consisted primarily of specific statutes prohibiting the discharge of particular substances into rivers and imposing minor criminal penalties for violations, leaving enforcement primarily to local health officials. An important step toward effective pollution control was accomplished through the enaction of an initiative measure in 1939. To satisfy its water quality standards, the Authority sought the cooperation of cities and industries in installing sewage treatment facilities for primary treatment and effluent chlorination. Additionally, it ordered pulp and paper mills to develop and install facilities for concentrated waste disposal. Later, it required the installation of secondary treatment works to treat the primary treated effluent. Where a polluter violates the present law, the Authority has two procedures to follow: (1) administrative hearing procedure, or (2) court action, which may include either the institution of a criminal proceeding or an injunctive proceeding. Problems of enforcement related to each procedure are discussed. (Shelnut-Florida)
W71-11641

PRACTICAL COMMENT: A LAWYER'S POLLUTION PRIMER,
Floyd Matthew.
South Dakota Law Review, Vol 16, No 2, p 309-320, 1971. 12p, 19 ref.

Descriptors: *South Dakota, *Water pollution control, *Legal aspects, *Water pollution sources, State governments, Federal government, Local governments, Jurisdiction, Regulation, Legislation, Judicial decisions, Permits, Standards, Inspection, Pollution abatement, Water pollution, Water pollution effects, Water Quality Act, Water quality control, Sewage treatment, Chemical wastes, Industrial wastes, Remedies.

Written for the lawyer, this article provides a general background of information on pollution and the legal methods available for pollution enforcement. The manner in which pollution is defined is the most important single factor in pollution litigation. Both conservation and preservation definitions are examined. Pollutants are classified into four groups: (1) biological pollution, (2) physical pollution, (3) organic pollution, and (4) chemical pollution. An understanding of the nature of the polluting materials, the method of their measurement, and their influence on given beneficial uses of water is essential. The article also considers pollution sources, the difference between point and area sources of pollution, and the effect of the sources on pollution enforcement proceedings. The Federal Water Quality Act of 1965 is analyzed in relation to its requirement of uniform standards of water quality. The statutory and administrative aspects of pollution control in South Dakota are examined. A legal analysis of various pollution laws is presented from the viewpoint of the water quality management professional. Federal, state, and local laws are considered. (Horwitz-Florida)
W71-11642

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

SIMULATION OF WATERWAY TRANSPORT SYSTEMS,
Pennsylvania Transportation and Traffic Safety Center, University Park; and Pennsylvania State Univ., University Park.
Joseph L. Carroll, and Michael S. Bronzini.
Transportation Engineering Journal, ASCE, Vol 97, No TE 3, Paper 8311, p 527-539, August 1971. 13 p, 3 fig, 17 ref, 1 append.

Descriptors: *Simulation analysis, *Inland waterways, *Transportation, Computer models, Linear programming, Systems analysis, Optimization, Planning, Locks, Monte Carlo method.

Computer simulation was used to investigate alternative improvements to inland waterways. This paper summarized the Pennsylvania State research and the resulting model. The simulation program itself consisted of two parts. (1) Towgen (tow generation program) used linear programming to determine the O-D (origin destination) pattern of empty barge movements, and randomly sampled the appropriate O-D and flotilla configuration matrices to produce a list of tows having specified characteristics. The clock time at which each tow entered the system was selected randomly, assuming an exponential distribution of inter-arrival times. (2) WATSIM (waterway simulation program) processed the tows through the system, moving each tow from its origin port to its destination. Point to point travel times were computed by means of Howe's equilibrium speed function. Locking operations were simulated via Monte Carlo techniques. The paper concluded by presenting some possible guide lines for employing the model as one part of a comprehensive waterway systems planning methodology. (Veverka-Cornell)
W71-10978

IMPLICATIONS OF SYSTEMS ANALYSIS TO INLAND NAVIGATION,
Office of the Chief of Engineers (Army), Washington, D.C.
DuWayne A. Koch.
Journal of the Waterways Harbors and Coastal Engineering Division, ASCE, Vol 97, No WW 3, Proc Paper 8302, p 559-566, August 1971. 8 p, 1 fig, 1 tab, 5 ref, 1 append.

Descriptors: *Inland waterways, *Navigation, *Transportation, *Systems analysis, Simulation analysis, Economics, Locks, Channels, Optimization, Planning.

Demands placed upon inland navigation as a mode of transportation necessitated that an analyst be cognizant of the interrelationship of the system's component parts. This pertained to navigation as a portion of the transportation system, as well as each lock, harbor and channel improvement as a part of the system of navigation. One method by which this analysis was accomplished was through the simulation of the navigation system. To properly conduct such a study, however, the analyst had to accurately identify and represent the characteristics of the navigation system which he proposed to simulate. These characteristics included: (1) the physical water-way itself; (2) the characteristics of the towboat industry; and (3) the waterborne commerce and towboat itineraries which were expected to utilize the waterway over the life of the project. (Veverka-Cornell)
W71-10980

OPTIMAL RELEASE RULE FOR OPERATING A FINITE DAM,
Indian Inst. of Management, Calcutta.
For primary bibliographic entry see Field 04A.
W71-10982

THE SAMPLING OF OPTIMAL PARAMETERS AND REGIMES FOR WATER-RESOURCE SYSTEMS AT A PROBABILISTIC AND INDETERMINISTIC INITIAL INFORMATION,
Siberian Energy Inst., Irkutsk (USSR).
L. S. Belyaev, and Y. P. Syrov.
Proceedings of 14th Congress of International Association for Hydraulic Research, Hydraulic Research and its Impact on the Environment, Vol 5, p 402-1--402-4, 29 August-31 September 1971. 4 p, 9 ref.

Descriptors: *Water resources development, *Sampling, Heterogeneity, Probability, Optimization, Parametric hydrology, Costs, Flow, Storage, Economics, Monte Carlo method.
Identifiers: Angara Enisseisky power plant.

This paper concerned methods of deciding optimization problems of a great dimension at a state of heterogeneous information. Such problems were involved in projecting and exploiting water-resource systems. Part of the initial data were random value as river flow storage, technical-economical indexes (structure cost, production price, etc.), and the partakers' water demand of the water-resource complex. The major optimization problems solvable for the above were mathematically formulated by an unlinear function characterizing the expenditure in the system; thus making it necessary for the function value to be as minimal as possible. Two categories of optimization conditions were (1) probabilistic-deterministic, and (2) indeterministic (random values). The Monte Carlo method was used to optimize long term (years, seasons) regimes of the Angara-Enisseisky power plant cascade. (Veverka-Cornell)
W71-10983

MODERN TECHNIQUES IN GROUND-WATER STUDIES,
Department of Water and Power, Los Angeles, Calif.
For primary bibliographic entry see Field 04B.
W71-10984

ALTERNATE POLICIES FOR RIVER BASIN WATER QUALITY MANAGEMENT,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
For primary bibliographic entry see Field 05G.
W71-10985

OPTIMUM WATER MANAGEMENT UNDER THE TEXAS WATER PLAN,
Texas A and M Univ., College Station; and Texas Water Development Board, Austin.
For primary bibliographic entry see Field 04A.
W71-10986

SYSTEM ANALYSIS IN WATER RESOURCE MANAGEMENT,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W71-10987

A PERTURBATION ANALYSIS OF TWO-PHASE INFILTRATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02G.
W71-11064

INFILTRATION PREDICTIONS BY A MOVING STRAINED COORDINATES METHOD,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02G.
W71-11065

A STUDY OF NATURAL WIGGLY LINES IN HYDROLOGY,
Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
For primary bibliographic entry see Field 02J.
W71-11068

PROBABILITY OF LEVEE BREAKS DUE TO HEAVY RAINFALLS IN A RIVER,
Kyoto Univ. (Japan) Disaster Prevention Research Inst.
Yasuo Ishihara, and Kunio Seno.
Bulletin of the Disaster Prevention Research Institute, Vol 20, Part 1, Paper No 171, p 37-50, October 1970. 14 p, 8 fig.

Descriptors: *Probability, *Floods, *Flood forecasting, Flood protection, Statistical methods, Peak discharge, Water storage, Levees.
Identifiers: *Levee break forecasting.

A levee break upstream in a river system results in reduction of the flow downstream, because flooding due to the levee break has a similar effect to diverting flood waters into a reservoir and impounding them. This paper describes how to evaluate the probability of a levee break in the levee system of a river. This probability can be evaluated by applying the multidimensional probability theory. A computational example is presented, and it is concluded that a levee break in the upstream area reduces the flood risk in the downstream area, and that the larger the correlation coefficient between the peak discharges of two flood hydrographs from the upper and lower sub-basins is, the less the effect of the reduction becomes. (Knapp-USGS)
W71-11130

APPLICABILITY OF MATHEMATICAL MODELS OF GROUNDWATER FLOW SYSTEMS TO HYDROGEOCHEMICAL EXPLORATION,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 02F.
W71-11131

FLOOD ROUTING IN THE JAMES RIVER,
Virginia Polytechnic Inst., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W71-11317

A COMPUTER MODEL OF FLOOD FLOWS IN THE JAMES RIVER,
Virginia Polytechnic Inst., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W71-11318

SIMULATION OF WATER QUALITY IN STREAMS AND CANALS,
Masch (Fred D.) and Associates, Austin, Tex; and Texas Water Development Board, Austin.
For primary bibliographic entry see Field 05B.
W71-11352

DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT THE ROLE OF SURFACE RUNOFF AND GROUNDWATER FLOW IN OVERFERTILIZATION OF SURFACE WATERS,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W71-11400

NATURAL HAZARD IN HUMAN ECOLOGICAL PERSPECTIVE: HYPOTHESES AND MODELS,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 06G.
W71-11614

6B. Evaluation Process

PLANNING AND MANAGEMENT OF WATER RESOURCES IN METROPOLITAN ENVIRONMENTS,
George Washington Univ., Washington, D.C. Natural Resources Policy Center.
Robert K. Davis, Steve H. Hanke, Julie D. Hyde, Michael A. Smith, and Robert S. Want.
Available from the National Technical Information Service as PB-201 911, $3.00 in paper copy, $0.95 in microfiche. Natural Resources Policy Center Final Report, June 1971. 225 p, 5 fig, 22 tab, 4 append. OWRR Project C-1748 (No 3165) (1) and C-1357 (No 1972) (2).

Descriptors: *Economic efficiency, *Water supply, *Drouths, *Pricing, Municipal water, Cost analysis, Water rates, Optimization, *Planning, *City planning, Urbanization, Cities, District of Columbia.
Identifiers: *Urban water economics, *Peak-load pricing, Cost minimization, Water supply planning, *Washington D.C. area.

The objective was to propose two alternatives to the conventional 'requirements' approach to water supply management. The first alternative--based on a simulation of the Washington, D.C., metropolitan area--was to accept the infrequent occurrance of drought as natural and to absorb the losses that are thereby imposed. Under conditions of the infrequent probability of drought, the losses may prove less than the costs of avoidance. The second alternative to conventional supply management was in the realm of policies concerning the price charged for water. A seasonal pricing model is applied to the Washington, D.C., metropolitan area. This model will significantly reduce peak summer demands and thus will delay otherwise necessary investment in new facilities. Another dimension of pricing discussed is the question of urban water supply extension. In the case of the Washington, D.C., metropolitan area, new users are not being charged the incremental costs of extending service to them but in fact are being subsidized in this regard by the rest of the system.
W71-10970

ENVIRONMENT: A CHALLENGE FOR MODERN SOCIETY,
Indiana Univ., Bloomington.
Lynton K. Caldwell.
The Natural History Press, Garden City, N.Y., 1970. 251 p.

Descriptors: *Ethics, *Ecology, *Natural resources, *Social values, *Institutional constraints, Social change, Planning.
Identifiers: *Environmental quality, *Resource policy, *Public responsibility, Environmental adaptation, Comprehensive planning, Public function.

The thesis of this book is that if modern man and his civilization are to survive, administration of man's environmental relationships must become a major task of government. The term 'environmental administration' has been used to designate this task, meaning purposive shaping of the human environment by man himself and the control action in relation to the environment. More is said about political philosophy than about management or engineering in their operational meanings. Examination is made of ethical bases of environmental administration. Man/environment relationships are discussed from several perspectives--policy, tasks, and management. (Wray-Chicago)
W71-10971

INFORMATION FOR URBAN AFFAIRS IN CANADA,
Canadian Council on Urban and Regional Research.
Michel Barcelo, Henry C. Campbell, and Dennis A. Young.
Canadian Council on Urban and Regional Research, 1971. 80 p, 8 tab, 8 fig, 7 append.

Descriptors: *Communication, *Information retrieval, Inter-agency cooperation, *City planning.
Identifiers: *Information transfer, Urban affairs, Data analysis, Canada, Bi-lingualism.

The Canadian Council on Urban and Regional Research was charged with determining the main requirements of urban information users across Canada and the potential sources of this information. The goal of the study was to present proposals for more reliable delivery and use of urban information in Canada. The survey of users' requirements involved interviews in a structured sample of over 120 Canadian units of urban administration. Rather than a statistical report, this study is an evaluation of the difficulties faced by urban information users, and presents recommendations to improve information transfer. The analysis of the data gathered has given rise to the following priorities of action: (1) more effective and adequate internal information services for individual municipalities; (2) need for qualified information staffs; (3) intermunicipal cooperation in computer use; (4) analysis of cost of municipal information; (5) establishment of a network and clearinghouse for information exchange. A Canadian Urban Information Exchange Service utilizes three organizational concepts: (1) cooperation among information producing bodies, (2) linking agencies in an information network, (3) use of a bi-lingual urban information exchange clearinghouse. (Wray-Chicago)
W71-10972

INCENTIVES AND CONTROL FOR OPEN SPACE,
Ann Louise Strong.
In: Metropolitan Open Space and Natural Process, University of Pennsylvania, Philadelphia, 1970, p 81-123. 7 fig, 4 tab.

Descriptors: *Community development, *City planning, Resource development, Natural resources, Environment, Recreation.
Identifiers: *Metropolitan open space, *Natural process, *Controls and incentives, Metropolitan areas, Land use.

This article considers what combinations of land use restrictions and land use controls, enacted by what public agencies, are best suited to realization of the goal of protection of natural resource land for Philadelphia. Emphasis in the recommendations is on long-term protection of the natural resource system, rather than on low initial cost or greatest immediate public acceptability. The inquiry into controls and incentives is founded on one major premise, namely that the natural resource areas to be protected are part of a functionally logical natural system--that of water in process--and that the water regimen as the major indicator of many related processes is important to man's well-being. Controls and incentives for parts of the system must be adopted with the objective of protecting the total system. Vital by-products of protection of the system will be provision of recreation areas and preservation of natural amenity in the metropolitan area. Three general observations made are: (1) preservation of the hydrologic function of the land does not necessarily assure that land will continue in open space use; (2) the selection of controls must be made with reference to judgments concerning the character, location and volume of the current; (3) physiographic types frequently overlap making it necessary to apply controls for each of the coincident types in conjunction with one another. Public agencies primary responsibility for implementation of public plans, and emphasis on their role whould not minimize the importance or efficacy of private organizations. (Wray-Chicago)
W71-10973

THE DISTRIBUTION AND VALUE OF OPEN LAND IN THE PHILADELPHIA AREA,
Pennsylvania Univ., Philadelphia.
Nohad A. Toulan.
In: Metropolitan Open Space and Natural Process, University of Pennsylvania, Philadelphia, 1970, p 53-80. 7 fig, 11 tab.

Descriptors: *Land use, *City planning, Urbanization, Natural resources, Values.
Identifiers: *Open land, Land control, Natural process, Philadelphia.

This chapter summarizes the relative values and distribution characteristics of land significant to natural process in the Philadelphia Standard Metropolitan Statistical Area. It is evident that with a given amount of money, a wide range in amounts of land can be controlled or acquired. In the absence of information on the relative importance to the water regimen of various characteristics, along with their significance for development, recreation or amenity, a priority system for their retention cannot yet be set up. When that information is available, based on more detailed scientific study, then the degree of intervention which can be tolerated in the water regimen as related to other values can be ascertained and combinations of land control and regulation can be set up as the possible outcome of a least-cost solution. (Wray-Chicago)
W71-10974

OPEN SPACE FROM NATURAL PROCESSES,
Pennsylvania Univ., Philadelphia.
Ian L. McHarg.
In: Metropolitan Open Space and Natural Process, University of Pennsylvania, Philadelphia, 1970, p 10-52. 15 fig.

Descriptors: *Land use, *City planning, *Flood control, *Urbanization, Ecology, Social values, Flood plains.
Identifiers: *Natural process, *Metropolitan open space, Metropolitan areas, Environmental policy.

The indiscriminate metropolitan urbanization dramatizes the need for an objective and systematic way of identifying and preserving land most suitable for open space, diverting growth from it, and directing development to land more suitable for urbanization. The assumption is that not all land in an urban area needs to be all developed. Therefore choice is possible. The discrimination which is sought would select lands for open space which perform important work in their natural condition, are relatively unsuitable for development, are self-maintaining in the ecological sense, and occur in a desirable pattern of interfusion with the urban fabric. The optimum result would be a system of two intertwining webs, one composed of developed land and the second consisting of open space in a natural or near natural state. The criteria for metropolitan open space should derive from an understanding of natural processes, their value to man, their permissiveness, and their prohibition to development. The aggregate value of land, water, and air resources to justify a land use policy which reflects both the value and operation of natural processes. The ecological view of selecting open space represents a perceptive method and could considerably enhance the present mode of planning which disregards natural process. (Wray-Chicago)
W71-10975

ECONOMIC AND FISCAL ASPECTS OF OPEN SPACE PRESERVATION,
Pennsylvania Univ., Philadelphia.
William G. Grisby.
In: Metropolitan Open Space and Natural Process, University of Pennsylvania, Philadelphia, 1970, p 124-147. 1 fig.

Descriptors: *Economics, *Land use, *City planning, Natural resources, Costs.
Identifiers: *Open space, *Economic and fiscal aspects, Urban environment, Metropolitan areas.

Resistance to programs for the preservation of large amounts of undeveloped land in metropolitan areas is based in part on the argument that economic costs would be greater than benefits. The

analysis here suggests that within wide limits economic costs are actually unimportant. The probable cost of open space programs to the public sector is, however, quite large, so the question of benefits cannot be permanently avoided. Also, quantitative data which relate the contribution of specific types of undeveloped land to specific open space goals are lacking. As a consequence, fairly arbitrary choices must be made. One set of guidelines which may partially resolve this dilemma is presented. What are needed are in-being land use plans that give more equal weight and more objective consideration to both open space and development requirements. An adequate open space plan would not only preserve openness within urbanized areas, but accelerate needed development and redevelopment as well. (Wray-Chicago)
W71-10976

DESIGN OF METROPOLITAN OPEN SPACE BASED ON NATURAL PROCESS,
Pennsylvania Univ., Philadelphia.
William H. Roberts.
In: Metropolitan Open Space and Natural Process, University of Pennsylvania, Philadelphia, 1970, p 148-189. 19 fig.

Descriptors: *Land use, *City planning, Costs, Natural resources.
Identifiers: *Metropolitan open space, *Natural process, Metropolitan areas, Environmental quality.

This chapter is concerned with the design implications, opportunities and methods used when planning metropolitan open space on the basis of natural process. While traditional approaches to the location of open space in metropolitan areas have preserved many major stream valleys and areas important to natural process, more often open space has been conceived as a residual to a desired development pattern, or as a formal pattern itself. Design for open space should start with a pattern of open space and limitations for development based on maximum preservation of natural processes and amenity. This pattern can then be progressively modified where necessary to accommodate the demands of metropolitan growth. A method is proposed whereby an understanding of the workings of the natural systems and the impact of development on them will permit the tradeoffs to be made with more complete knowledge. (Wray-Chicago)
W71-10977

WASTEWATER LOADING GUIDELINES FOR THE GRAND RIVER BASIN.
Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 05C.
W71-11017

APPLIED CRITERIA FOR MUNICIPAL WATER RATE STRUCTURES,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 06C.
W71-11203

APPLIED CRITERIA FOR MUNICIPAL WATER RATE STRUCTURES, HANDBOOK,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 06C.
W71-11204

LOUISIANA AND THE SEA GRANT PROGRAM,
Louisiana State Univ., Baton Rouge. Office of Sea Grant Development.
For primary bibliographic entry see Field 02L.
W71-11272

A PROPOSED STREAMFLOW DATA PROGRAM FOR CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07A.

W71-11360

ECONOMIC CONSEQUENCES OF INTER-BASIN WATER TRANSFER,
Oregon State Univ., Corvallis. Agricultural Experiment Station.
Bruce R. Beattie, Emery N. Castele, William G. Brown, and Wade Griffin.
Available from the National Technical Information Service as PB-202 210, $3.00 in paper copy, $0.95 in microfiche. Oregon State Univ, Corvallis, Agricultural Experiment Station Bulletin 116, June 1971, 82 p, 3 fig, 7 tab, 60 ref, 3 app. OWRR Project C-1220 (No 1599) (1).

Descriptors: *Inter-basin transfers, Regions, Costs, Political aspects, Evaluation, Cost-benefits ratio, *Marginal utility, *Income, *Economic efficiency.
Identifiers: Regional income redistribution, Marginal value product, Political effects, Economic models.

A model to measure the economic efficiency effects of interbasin water transfer has been developed. It is capable of accommodating multiple uses, values in transit, and production interdependencies. By accounting for regional direct and indirect costs and pecuniary externalities, regional income redistribution impacts of interbasin water transfer schemes can be estimated. The marginal value product of an acre-foot of water used on irrigated cotton and .91 acre of land was estimated to be $33.32. In any complete analysis of water transfer projects, regional income distribution consequences of water transfer projects must be considered in addition to economic efficiency effects. Regions and people benefiting may be useful in predicting political effects of water tranxfer plans.
W71-11398

SOCIOLOGICAL ASPECTS OF WATER-BASED RECREATION IN IOWA,
Iowa State Univ., Ames. Dept. of Sociology and Anthropology.
Dean R. Yoesting, and Dan L. Burkhead.
Available from the National Technical Information Service as PB-202 560-U, $3.00 in paper copy, $0.95 in microfiche. Iowa State Water Resources Research Instiite, Ames, Completion Report ISW-RRI39 (Sociology Report 94), June, 1971, 120 p, 25 tab, 70 ref, 2 append. OWRR Project A-037-IA (1).

Descriptors: *Social aspects, *Attitudes, Water pollution effects, *Recreation, Decision-making, Sociology, Water resources development, *Iowa, Recreation facilities, Rural areas.

A sample of 137 rural Iowa residents and is represented by scale development. Four scales are presented: (1) governmental involvement re: supervision and control of recreation and pollution, which measures the extent that the individual perceives that the government should be the agent of control of water-related recreational facilities and actions directed toward pollution abatement; (2) antirecreational facility expansion, which measures the extent an individual feels that present facilities are adequate to the needs or desires of the users; (3) tax-supported, regulation-free recreation, which measures the degree to which individuals feel that recreation is a right, that maintenance responsibility is the government's and of an individual's disregard or unawareness of the delicacy of ecosystems and pollution's effect; and (4) a leisure orientation scale. These scales were examined for reliability and validity using various statistical techniques. The measurement criteria included: reliability coefficients, item-to-total correlations, intercorrelations of individual items, examination of the means and standard deviations of each item, examination of item correlations to various independent variables and criterion oriented validity. Various socioeconomic variables were correlated to each of the scales. Another section is concerned with the perception of water pollution and is an attempt to determine significant factors related to the effect of water pollution in influencing one's leisure behavior at recreation areas.

W71-11402

CHANGING ATTITUDES TOWARD WATERSHED DEVELOPMENT,
Mississippi State Univ., State College. Water Resources Research Inst.
John H. Peterson, Jr., and Peggy J. Ross.
Available from the National Technical Information Service as PB-202 207, $3.00 in paper copy, $0.95 in microfiche. Completion Report, Mississippi Water Resources Research Institute, State College, 1971, 51 p, 32 tab, ref, append.

Descriptors: *Attitudes, *Watershed management, Social impact, *Social change, Social behavior (Animal), Behavior, *Social adjustment, Mississippi.

Changes in attitudes were examined of local landowners toward watershed development which took place during a six-year period in which a small watershed development project (under PL 566) was underway in their area. An earlier study undertaken prior to construction. Attitude change was measured in terms of changes in percent of landowners expressing favorable or unfavorable attitudes. Factors associated with higher levels of favorability were examined. The findings suggest that implementation of the watershed project led to increasingly favorable attitudes toward water resource development. Change in attitude toward watershed projects was largely positive, although there was an increase in negative attitudes toward what local landowners perceived as certain liabilities of the program. Contact with the watershed project had a more direct impact on knowledge of the project and attitudes toward it, than on attitudes toward water conservation in general. Positive attitudes toward water resource development were found to be associated with project related experience, perceived benefits and characteristics generally associated with higher socio-economic status. These findings suggest that just as favorable attitudes facilitate water resource development, water resource development can contribute to the formation of favorable attitudes.
W71-11404

SIMULATION OF THE HYDROLOGIC-ECONOMIC FLOW SYSTEM IN AN AGRICULTURAL AREA,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 03F.
W71-11407

EVALUATION IN WATER RESOURCES MANAGEMENT AND DEVELOPMENT, A Report of the Task Force on Water Resources Evaluation of the Universities Council on Water Resources.
Universities Council on Water Resources.

Available from the National Technical Information Service as PB-202 207, $3.00 in paper copy, $0.95 in microfiche. 1971, 42 p. OWRR Project X-107 (No 3182) (1).

Descriptors: *Evaluation, Education, *Universities, Training, *Research and Development, Management, Planning, *Decision-making, *Water resources development, *Social aspects, Cost-benefits ratio, Cities.
Identifiers: Universities Council on Water Resources, Office of Water Resources Research.

This task force of the Universities Council on Water Resources (UCOWR) was concerned with providing perspective and guidelines for making the evaluation process a more meaningful and viable activity. Its report presents (1) a brief overview of the evaluation process; (2) identifies some needed changes in conceptual approach; and (3) proposes some lines of research to improve subject-matter focus and methodology. A number of the major conclusions and recommendations had been adopted at the UCOWR conference at Blacksburg, Virginia, July 29, 1970. Additional recommenda-

tions included: With regard to suitable research projects dealing with the evaluation processes, the Office of Water Resources Research (OWRR) should specifically identify projects of high priority and take the lead in developing those projects even to the point of assembling research teams. The OWRR should consider extending the length of time for which it normally funds research projects in order that some of the research projects dealing with evaluation processes can be carefully planned and staged over intervals of time sufficient to provide meaningful and successful research undertakings. The OWRR should take the initiative in developing some interinstitutional and interregional projects that will foster new forms of research collaboration and hopefully provide some new research 'break throughs.'
W71-11408

GULF ENVIRONMENT PROGRAM'S BENEFIT TO THE MARINE INDUSTRY,
Gulf Universities Research Corp.
For primary bibliographic entry see Field 05G.
W71-11443

FUTURE RESEARCH AND DEVELOPMENT FOR MARITIME POLLUTION PREVENTION AND CONTROL SYSTEMS,
Maritime Administration, Washington, D.C.
For primary bibliographic entry see Field 05G.
W71-11449

THE TEXAS WATER PLAN AND ITS EFFECT ON ESTUARIES,
Bureau of Commercial Fisheries, Washington, D.C.
For primary bibliographic entry see Field 05C.
W71-11461

WATER IN AN URBAN AGE,
Minnesota State Planning Agency, Minneapolis. Water Resources and Basin Coordination.
Guy J. Kelnhofer, Jr.
Water Spectrum, Vol 3, No 2, p 1-7, Summer 1971, 10 photo.

Descriptors: *Decision making, *Cities, *Water resources development, *Planning, Political aspects.
Identifiers: *Urban water management, Water development.

The needs of the urban dweller are increasingly becoming the concern of national and regional water development programs. The importance of this concern in representing a reassessment of traditionally rural concerns in water development is undermined by the fact that the urban spokesman too often comes to the planning table just as an opponent. The urban water user must create water planning, development, and management machinery that will constructively and effectively represent his views in the decision making process. Defining the interests of urban areas in water and related land resources, combining related functions of water under one common management, evaluating and implementing research data more quickly, producing more trained resource planners, increasing communication between interest groups, and improving systems of public decision making are some of the problems that must be realized and solved in any future development of urban water management. (Strachan-Chicago)
W71-11603

THE SYSTEMS APPROACH: AN EXPERIENCE IN PLANNING,
Corps of Engineers, Boston. North Atlantic Div.
Harry E. Schwarz, and David C. Major.
Water Spectrum, Vol 3, No 2, p 32-37. Summer 1971, 1 photo, 1 chart.

Descriptors: *Planning, *Water resources development, *Regional analysis, Systems analysis.
Identifiers: *Planning process, *North Atlantic Regional framework study (NAR), Systems technique, Multi-objective framework.

The most important part of a plan is the planning process used to produce the plan. Some of the innovative methods and models are discussed that were used to make an effective planning process for the North Atlantic Regional (NAR) framework study, which provides overviews of regional water needs and supplies for the Water Resources Council. An important aspect of the methods and models is that they are for a large part reproducible because of careful documentation. Consequently, they can be adapted in the future to other planning areas and planning problems. The authors conclude that the use of systems techniques within a multi-objective framework is the best method for water resources planning. (Strachan-Chicago)
W71-11605

EVALUATING THE VISUAL AND CULTURAL LANDSCAPE,
Research Planning and Design Associates, Inc., Amherst, Mass.
Ervin H. Zube.
Journal of Soil and Water Conservation, Vol 25, No 4, p 137-141. July-August 1970, 3 fig, 1 ref.

Descriptors: *Decision making, *Landscaping, *Environmental effects, Land use planning, *Water resources development.
Identifiers: *Cultural landscape, *Visual landscape, *North Atlantic Regional Water Resources (NAR) study, Environmental values.

This article discusses the North Atlantic Regional Water Resources (NAR) Study with respect to its consideration of visual and cultural environmental values in decision making. Three areas of importance in developing an approach to making visual and cultural environmental values effective decision making variables are delineated and examined. (1) A landscape inventory technique which considers the entire landscape, is founded on visual indicators, uses a minimum of easily available data, and also accommodates the insertion of more data related to specific steps in the planning process. (2) Identification and evaluation of visual qualities in the landscape. (3) Application of water and related land planning and management concepts for environmental quality which relate to water management devices, are based on the inventory and evaluation data, and relate the needs of the people to the landscape on a priority basis over three study time periods. (Strachan-Chicago)
W71-11606

REGIONAL GOVERNMENT AND CONSERVATION,
University of Western Ontario, London.
Eric Beecroft.
Journal Of Soil and Water Conservation, Vol 26, No 2, p 66-69. March-April 1971, 2 photo, 11 ref.

Descriptors: *Conservation, *Environmental effects, Decision making, *Regional analysis, *Institutional aspects, Political aspects.
Identifiers: *Regional government, *Regional institutions, Technocracy, Policy making.

The author detects a movement towards the convergence of community politics and environmental science in the United States and Canada. Little concern has been shown for the role of political means in the achievement of environmental quality, while scientific environmental issues have received a vast amount of consideration. The article claims that there is danger in this concentration on technocratic thinking within the problems of environmental quality. Part of the price of environmental quality, a stable regional economy, and economical patterns of growth and redevelopment is an effort to make responsive, democratic multipurpose regional government work. The only alternative to regional government is a set of powerful, centralized, politically unresponsive technocracies which would coordinate only at the central bureaucratic level, and would disregard the interests and needs of the populace. Development of a workable, all-purpose regional institution close to the people who will join with elected officials in designing and evaluating their separate communities is essential if we are to avoid the dangers of technocratic thinking. (Strachan-Chicago)
W71-11607

THE LEGAL AND ECONOMIC ASPECTS OF POLLUTION,
Chicago Univ., Ill. Center for Policy Study.
For primary bibliographic entry see Field 05G.
W71-11608

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

PLANNING AND MANAGEMENT OF WATER RESOURCES IN METROPOLITAN ENVIRONMENTS,
George Washington Univ., Washington, D.C. Natural Resources Policy Center.
For primary bibliographic entry see Field 06B.
W71-10970

'WATER REUSE SYSTEMS ANALYSIS', DISCUSSION BY A. BRUCE BISHOP AND DAVID W. HENDRICKS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
David H. Marks, and Guy Leclere.
Journal of the Sanitary Engineering Division, ASCE, Vol 97, No SA4, p 541-542, August 1971. 2 p.

Descriptors: *Reviews, *Water reuse, *Costs, *Systems analysis, *Optimization, Transportation, Water treatment, Tertiary treatment, Linear programming, Water demand.

Bishop's and Hendrick's paper on a systems approach for analyzing water reuse alternatives which was developed for sequential and recycle water reuse was discussed. Noted particularly was their attempt to show that the question of finding the least cost allocation to satisfy given demands for different quantities and qualities of water from known source alternatives might be modeled as a simple trans-shipment model of linear programming for which quick solution might be obtained using hand or computer methods. However, questions were raised concerning statements in the paper which the writers felt might be explained somewhat further. Questions such as those revolving around the representation of blending plants in the model, or the question of planning over time and the interdependency of projects were offered. (Veverka-Cornell)
W71-10979

NEW YORK STATE ENVIRONMENTAL FACILITIES CORPORATION ACT.
For primary bibliographic entry see Field 06E.
W71-11171

APPLIED CRITERIA FOR MUNICIPAL WATER RATE STRUCTURES,
Florida Univ., Gainesville. Dept. of Economics.
Charles W. Fristoe, Frederick O. Goddard, and Norman G. Keig.
Available from the National Technical Information Service as PB-202 013, $6.00 in paper copy, $0.95 in microfiche. Final Report (1971), 372 p, 25 fig, 40 tab, 28 ref, append. OWRR Project C-1082 (No. 1578) (2).

Descriptors: *Rates, *Pricing, *Water-rates, Prices, *Costs, Evaluation, *Municipal water, Demand, Water demand, Value, Water management (Applied), *Use rates, Water costs, Water users, Water utilization.

With regard to the printing of the services of municipally-owned water systems, a detailed presentation and evaluation of the policies and practices is made followed by municipal water utilities and an in-depth analysis of the demand and cost elements of the water pricing problem. Seven recommendations for developing appropriate water rate structures are made. The demand basis for rate structures should be completely abandoned as an approach to rate making, the most efficient and equitable method of determining rates with current technologies is a modified marginal cost basis in which rates are based upon engineering estimates of peak and offpeak incremental costs, the use of declining block rate structures must inherently lead to either less efficiency or less equity, and should be abandoned, a modification of the functional cost basis that separates capital and operating costs for determining peak and off-peak rates is preferable to the current functional cost method. Fire charges should be computed according to the incremental costs of providing service. Any required current surplus or profits for covering fire charges or for contributions to municipal government should be considered as a tax. The minimum charge to small customers should consist of the standard fixed charge plus a charge based upon a minimum level of water use not exceeding 5,000 per month. (See also W71-11204)
W71-11203

APPLIED CRITERIA FOR MUNICIPAL WATER RATE STRUCTURES, HANDBOOK,
Florida Univ., Gainesville. Dept. of Economics.
Norman G. Keig, Charles W. Fristoe, and Frederick O. Goddard.
Available from the National Technical Information Service as PB-202 014, $3.00 in paper copy, $0.95 in microfiche. Supplement to Final Report, 1971, 78 p, 6 tab, 2 append. OWRR Project C-1082 (No. 1578) (2).

Descriptors: *Rates, *Pricing, *Water rates, Prices, *Costs, Evaluation, *Municipal water, Demand, Water demand, Value, Water management (Applied), *Use rates, Water costs, Water users, Water utilization.

For a publicly owned water utility there are no forces of competition to furnish a guide for its pricing and investment decision. There is danger of creating a situation where customers with inelastic demands are furnishing funds to create capacity for the benefit of those with elastic demands. An increase in price to the former group would raise total revenue almost in proportion to the price increase, while at the same time, lowering total costs. Within a given capacity there is an incentive to lower price for uses for which the demands are price elastic. Price reductions raise total revenue and the net revenue of the utility. With declining block rates, the incremental price may approach the short-run marginal (incremental) cost. There is danger that pricing decisions may become divorced from investment decisions. Much of the discrimination in favor of the sprinkling demand probably results from the lack of economic sophistication. A water utility should pursue a policy of charging the users of a water service the full cost of supplying it. Some water utility managements feel the utility is not meeting its obligation to the public if the full market demands cannot be met. There is no justification for this belief. An 'always ready to serve' policy, does not necessarily promote the public interest. (See also W71-11203)
W71-11204

6D. Water Demand

'WATER REUSE SYSTEMS ANALYSIS', DISCUSSION BY A. BRUCE BISHOP AND DAVID W. HENDRICKS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06C.
W71-10979

6E. Water Law and Institutions

INCENTIVES AND CONTROL FOR OPEN SPACE,
For primary bibliographic entry see Field 06B.
W71-10973

ELVES V KING COUNTY (INJUNCTIVE RELIEF AGAINST MUNICIPAL SEWAGE DISPOSAL).

299 P2d 206-207 (Wash 1956).

Descriptors: *Washington, *Municipal wastes, *Pollution abatement, *Sewage disposal, Water pollution control, Local governments, Judicial decisions, Legal aspects, Prescriptive rights, Groundwater, Water pollution, Relative rights, Water quality, Sewage, Waste disposal, Waste water disposal, Waste water (Pollution), Water pollution effects, Public health, State governments, Water rights, Remedies, Land tenure, Real property.
Identifiers: Injunction (Prohibitory).

Plaintiff landowners sought to enjoin the conveyance of raw sewage onto their land by defendant municipality. Defendant maintained ditches which collected waste water and channeled it through a culvert onto plaintiffs' property. Plaintiffs claimed the defendant's waste water contained human and animal excreta and therefore constituted a public nuisance. Defendant, however, claimed that it had acquired the right to convey such water onto plaintiffs' land by prescription, and that the water did not contain raw sewage. The Supreme Court of Washington held that casting raw sewage through a culvert onto private property constitutes an actionable public nuisance within the purview of state statute, and that the right to maintain a public nuisance cannot be acquired by prescription. The court ruled plaintiffs were entitled to maintain the action under a Washington statute because the public nuisance maintained by defendant was specially injurious to them. Defendant's actions were enjoined. (Horwitz-Florida)
W71-10995

GAME AND FISH COMM V FARMERS IRRIGATION CO (STATE FISH HATCHERY'S LIABILITY FOR WATER POLLUTION).

426 P2d 562-566 (Colo 1967).

Descriptors: *Colorado, *Pollution abatement, *Fish hatcheries, *Damages, Water pollution, Water pollution control, Water pollution sources, Water pollution effects, Pollutants, Condemnation, Condemnation value, Remedies, Non-consumptive use, Competing uses, Reasonable use, Domestic water, Irrigation water, Legal aspects, Judicial decisions, Streams, Downstream, Land tenure, Prior appropriation.

Plaintiff irrigation company sued defendant state game and fish commission for injunctive relief and damages based on pollution of stream waters by the state fish hatchery. Plaintiff alleged that the defendant in using stream water for its hatchery polluted the water and damaged plaintiff's domestic use of the stream water. Defendant denied that the stream was polluted and contended that the plaintiff was not entitled to injunctive relief. Defendant also contended that the damages which could be compensated should be based on the difference in value of the property before and after the alleged pollution. Affirming the trial court's judgment for plaintiff, the Supreme Court of Colorado held that injunctive relief is an appropriate remedy to prevent stream pollution to the injury of appropriators of water from that stream. The court noted that the evidence overwhelmingly pointed to the defendant's pollution of the stream. As the state had no constitutional right to condemn plaintiff's use of the stream, it could not require a measure of damages based on condemnation. A downstream owner, the court ruled, is entitled to compensation for actual loss sustained from pollution, including out-of-pocket expenses incurred in avoiding its consequences. (Smiljanich-Florida)
W71-10997

CUMMINGS V CORPORATION COMM OF OKLAHOMA (COURT SUPERVISION OVER AGENCY POLLUTION REGULATIONS CONCERNING THE OIL INDUSTRY).
319 P2d 602-607 (Okla 1957).

Descriptors: *Oklahoma, *Saline water pollution, *Oil wells, *Regulation, Pollution abatement, Judicial decisions, Legal aspects, Water pollution, Water pollution control, State governments, State jurisdiction, Administrative agencies, Standards, Legislation, Oil wastes, Water pollution sources, Saline water, Permits, Water rights, Well regulations, Supervisory control (Power).

The applicants operated three oil wells which produced 280 barrels of salt water per day. In order to dispose of this salt water the applicants sought permission from the Oklahoma Corporation Commission, as required by law, to inject the water into the annulus of their number 1 well and thereby dispose of the salt water underground. On appeal the applicants contended that the Commission order denying the application was unsupported by any finding of fact and that the action of the Commission in denying the application was arbitrary and therefore unlawful. The Commission relied upon the testimony of the conservation officer in charge of pollution. The Supreme Court of Oklahoma reversed the order, stating that the possibility of pollution of the fresh water strata was so remote, nominal, and speculative, that it did not constitute substantial evidence allowing denial of the permit. The order was therefore found to be arbitrary and unreasonable. (Horwitz-Florida)
W71-10998

D-X SUNRAY OIL CO V BILLUE (OIL POLLUTION OF UNDERGROUND WATER SUPPLY).
361 P2d 212-215 (Okla 1961).

Descriptors: *Oklahoma, *Water pollution, *Remedies, *Land tenure, Judicial decisions, Legal aspects, Underground storage, Wells, Subsurface waters, Land use, Damages, Water supply.

Plaintiff landowner brought an action against defendant sublessor of adjacent land for damages for permanent injuries to plaintiff's underground water supply. Beneath plaintiff's house was a well from which his family secured all the water used in the home. Subsequently, the well water became so heavily impregnated with petroleum products that it could not be used. This contamination was continuous for over ten years. Plaintiff contended that such injuries were caused by subsurface pollution which leaked from underground storage tanks owned by defendant. Defendant denied liability, contending that it had executed a sublease three years prior to the first contamination and that the sublessee had been in full, complete and exclusive possession since the execution. The Supreme Court of Oklahoma reversed a trial court judgment for plaintiff and held that, in the absence of an agreement on his part to repair, the sublessor is not liable to a third party for injuries to the latter's property resulting from a nuisance caused by gasoline percolating upon and on the third party's adjoining premises from storage tanks on sublessor's premises as a result of dilapidation of the leasehold premises while in possession of the sublessee. (Shelnut-Florida)
W71-11000

BROWN V LUNDELL (OIL AND GAS POLLUTION OF FRESH WATER SUPPLY).
334 SW2d 616-621 (Civ App Tex 1960).

Descriptors: *Texas, *Water pollution, *Oil-water interfaces, *Saline water, Oil, Oil industry, Oil fields, Natural gas, Subsurface drainage, Water pol-

lution sources, Leases, Water pollution effects, Damages, Remedies, Subsurface waters, Subsurface flow, Water pollution control, Judicial decisions, Legal aspects.

Plaintiff farm owner sought to recover damages from defendant oil and gas lessee for pollution of the underlying fresh water strata. Defendant discharged salt water into a pit, but the water escaped into plaintiff's fresh water supply. Plaintiff contended that defendant was negligent. Defendant asserted he had discharged salt water in the customary manner, which was not proven negligent; that plaintiff as the lessor had consented to the discharge; and that it had the right, as an oil and gas lessee, to dispose of salt water in the customary manner. The jury found that plaintiff's water was polluted by defendant's negligence. On appeal, the Texas Court of Civil Appeals determined that despite defendant's customary manner of discharge, evidence supported the jury verdict. The court stated that defendant could use the premises in a manner reasonably necessary to comply with lease terms. The court observed that defendant's duty to plaintiff was not to intentionally, willfully, or wantonly injure the water. The court determined that defendant had wantonly polluted the strata, and held defendant liable on grounds that he should have anticipated injury to plaintiff. (Hart-Florida)
W71-11002

HUMBLE PIPE LINE CO V ANDERSON (OIL PIPELINE OPERATOR'S LIABILITY FOR POLLUTION OF ADJACENT WATERS).
339 SW2d 259-265 (Civ App Tex 1960).

Descriptors: *Texas, *Pipelines, *Oil, *Water pollution sources, Judicial decisions, Legal aspects, Groundwater, Water pollution, Water wells, Shallow wells, Water supply, Water sources, Water quality, Pollution abatement, Relative rights, Remedies, Damages.

Plaintiff landowners sought to recover damages for the pollution of a water well by crude oil leaking from defendant pipeline company's underground pipeline. Plaintiff's well was approximately eighteen feet deep and located some 4,290 feet from defendant's pipeline. Plaintiffs alleged that the oil from defendant's pipeline penetrated the soil and water-bearing formations of plaintiffs' land and, thereby, permanently reduced its value. Plaintiffs alternatively alleged nuisance, negligence and trespass. Defendant denied any strict liability and claimed that the injury to plaintiffs' land was not permanent. The trial court rendered judgment for plaintiffs and defendant appealed. The Texas Court of Civil Appeals held that absent a finding of negligence a judgment based on alleged damages from leaks in an oil pipeline may not be entered against a common carrier operating under a statutory right. The court further ruled that the leaking of oil from a pipeline and its percolation underground to land where it polluted a well did not constitute a trespass, and that the operation of a pipeline is not a nuisance per se resulting in strict liability. Judgment for plaintiffs reversed and remanded. (Horwitz-Florida)
W71-11003

POWERS IN RESPECT OF NEW OIL AND GAS POOLS AND FIELDS (REGULATORY POWER TO PREVENT WATER POLLUTION).
New York Conservation Law sec 75 (McKinney 1967), as amended (Supp 1970).

Descriptors: *New York, *Oil wells, *Well regulations, *Water pollution control, Legislation, Legal aspects, Water law, State governments, Oil, Oil fields, Oil reservoirs, Secondary recovery (Oil), Natural gas, Flooding, Water pollution sources, Drilling, Well casings, Water quality control, Oil wastes, Oily water, Administrative agencies, Administrative decisions, Regulation.

With respect to oil pools or fields and natural gas pools or fields, the Conservation Department shall have the power to require the drilling, casing, operation, and plugging of wells in accordance with rules and regulations of the Department. The Department's power shall be exercised in such a manner as to prevent the: (1) escape of oil, gas, or water out of one stratum into another; (2) intrusion of water onto oil or gas stratum; (3) pollution of fresh water supplies by oil, gas, or salt water; and (4) blow-outs, cavings, seepages and fires. (Johnson-Florida)
W71-11013

BARAKIS V AMERICAN CYANAMID CO (CHEMICAL COMPANY'S LIABILITY FOR CROP DAMAGE FROM EFFLUENT DISCHARGE).
161 F Supp 25-35 (ND Tex 1958).

Descriptors: *Texas, *Water pollution, *Crops, *Industrial wastes, Riparian rights, Water pollution sources, Water pollution control, Saline water, Rivers, Navigable rivers, Droughts, Leases, Water rights, Waste water (Pollution), Waste water disposal, Waste disposal, Irrigation, Legal aspects, Judicial decisions, Riparian land, Remedies, Landfills, Land forming, Industrial plants, Industrial water.

Plaintiff riparian lessee sought damages from defendant upstream chemical company for crop injury. The defendant discharged water which plaintiff contended contained a high saline content. Plaintiff irrigated his crops with the same water. Virtually all of the water flowing in the river was composed of the effluent discharged from defendant's plant. Plaintiff's land had been artifically built by the lessor, and the lease conveyed no water rights. Plaintiff contended that: (1) his riparian rights had been violated, (2) the defendant had been negligent, and (3) the discharge constituted a nuisance. The federal district court determined that the defendant had violated no riparian rights of the plaintiff because no vested rights attach to artificial lands and no water rights were conveyed in the lease. Because plaintiff had not proven negligence and no statute had been violated, the court held that the complaint did not state a cause of action in negligence. The court also held that no nuisance existed because plaintiff brought the otherwise unoffensive water onto the land himself. It was furthermore held that defendant had no prescriptive right to discharge the effluent. (Hart-Florida)
W71-11020

UNITED STATES V FLORIDA-VANDERBILT DEVELOP CORP.
326 F Supp 289-291 (SD Fla 1971).

Descriptors: *Rivers and Harbors Act, *Judicial decisions, *Public rights, *Administration, Dredging, Legislation, Legal aspects, Water law, Federal government, Jurisdiction, Permits, Regulation, Water pollution control, Pollution abatement, Gulf of Mexico, Adjudication procedure.
Identifiers: *Qui tam.

In a qui tam action in behalf of the United States, for criminal penalties and injunctive relief, plaintiff citizen alleged violations by all defendants of the provisions of the Rivers and Harbors Appropriation Act of 1899 in connection with certain dredge and fill operations in navigable waters adjacent to the Gulf of Mexico. The action was dismissed, when the United States district court held that no authority existed under the Rivers and Harbors Act for civil actions by informers in behalf of the government under the qui tam theory. The court held that a qui tam action depends entirely upon statutory authorization, as it has never found its way into the common law. The fact that someone is entitled by statute to share in some penalty or forfeiture does not necessarily give such person the right to bring an original action to recover such penalty or forfeiture. The Department of Justice is the party authorized to institute such suits. (Horwitz-Florida)
W71-11023

ELLISON V RAYONIER INC (PRIMARY JURISDICTION IN DETERMINING VIOLATIONS OF POLLUTION STANDARDS).
156 F Supp 214-220 (WD Wash 1957).

Descriptors: *Washington, *Adjudication procedure, *Pollution abatement, *Water pollution, Administrative agencies, Pulp and paper industry, Pulp wastes, Waste disposal, Regulation, Standards, Administrative decisions, Judicial decisions, Legal aspects, Oysters, Commercial shellfish, Water pollution control, Water pollution sources, Water pollution effects, Legislation.

Plaintiff tideland owner sued defendant pulp and cellulose mill for damages from injury to plaintiff's oyster beds caused by pollution. Plaintiff alleged that discharges from defendant's plant trespassed on his lands and constituted a nuisance. Defendant answered that the Washington Water Pollution Control Act had abolished the common law pollution abatement actions of trespass and nuisance. Since the Act, however, did not expressly or impliedly repeal these actions, the federal district court held that plaintiff had properly sought damages under nuisance and trespass theories. Defendant also contended that the Act vested primary jurisdiction to determine actionable nuisance in the Washington Pollution Control Commission; the Commission rather than the court must determine whether regulations and water quality standards had been violated because such a determination involved special expertise. The court applied the doctrine of primary jurisdiction and held that plaintiff must seek a determination by the Pollution Control Commission as to whether the Commission's regulations and standards were violated by defendant. (Hart-Florida)
W71-11024

CRITICS WEIGH EPA HERBICIDE REPORT, FIND IT WANTING,
For primary bibliographic entry see Field 05C.
W71-11037

FEDERAL INSTALLATIONS, FACILITIES, AND EQUIPMENT POLLUTION CONTROL ACT (AMENDING THE FEDERAL WATER POLLUTION CONTROL ACT TO PROVIDE FOR IMPROVED COOPERATION BY FEDERAL AGENCIES TO CONTROL WATER AND AIR POLLUTION FROM FEDERAL INSTALLATIONS AND FACILITIES).
Senate Bill 560, 89th Cong, 1st Sess (1965). 5 p.

Descriptors: *Federal government, *Water pollution control, *Pollution abatement, *Water pollution treatment, Administrative agencies, Legal aspects, Regulation, Abatement, Inspection, Standards, Waste disposal, Waste treatment, Water pollution, Air pollution, Legislation, Federal jurisdiction, Supervisory control (Power), Treatment facilities.
Identifiers: *Federal Water Pollution Control Act.

In order to control water pollution, this bill amends the Federal Water Pollution Control Act to provide that any federal department or agency having jurisdiction over any building, installation or other property shall discharge waste therefrom only in compliance with standards for such discharges which the Secretary may establish. Appropriations are authorized to be expended for the installation, maintenance, and operation of waste disposal systems for any such government building or installation in accordance with plans approved by the Secretary. The reporting of waste-disposal systems to the Secretary is required of other government departments and the Secretary is herein ordered to t4ain the personnel of other agencies in such matters. Similar provisions are herein set forth for the amendment of the Clean Air Act to provide for: (1) the establishment of classes of potential air pollution sources within federal facilities, (2) the

procurement and operation of devices to control such pollution, and (3) the cooperation of federal agencies in controlling automotive air pollution. (Horwitz-Florida)
W71-11140

DETERGENT POLLUTION CONTROL ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO ESTABLISH STANDARDS AND PROGRAMS TO ABATE AND CONTROL WATER POLLUTION BY SYNETHETIC DETERGENTS).

House Bill 674, 92d Cong, 1st Sess (1971). 7 p.

Descriptors: *Federal government, *Detergents, *Water pollution control, *Standards, Federal jurisdiction, Water pollution, Water pollution sources, Water pollution treatment, Pollution abatement, Water policy, Administration, Legal aspects, Wastes, Waste water treatment, Treatment facilities, Inspection, Domestic wastes, Regulation, Administrative agencies, Research and development.
Identifiers: Federal Water Pollution Control Act.

This Bill states that the surface and ground waters of the United States are being seriously polluted by the continuing discharge of synthetic detergents whose components decompose either slowly or not at all. To abate and control water pollution it is necessary to insure that the components of synthetic detergents offered for introduction or delivery into interstate commerce, or imported into this country, and which may eventually be discharged into the nation's waters, not cause or contribute to the pollution of water. The Administrator of the Environmental Protection Agency shall encourage and assist research and development by public and private agencies to develop synthetic detergents which will substantially decompose in sewage treatment processes without impairing such processes, and to develop new or improved sewage treatment processes which have an improved capacity for decomposing existing or new detergents. The Administrator, with the aid of a technical committee, shall establish standards of biodegradability, decomposability and water eutrophication ability which must be met by all synthetic detergents. Enforcement provisions and punitive measures are established which enable the Administrator to deal with any violators. (Horwitz-Florida)
W71-11159

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE OCEAN, COASTAL, AND OTHER WATERS OF THE UNITED STATES.

House Bill 805, 92d Cong, 1st Sess (1971). 5 p.

Descriptors: *Federal government, *Pollution abatement, *Coasts, *Standards, Wildlife conservation, State governments, State jurisdiction, Federal jurisdiction, Water pollution control, Legal aspects, Regulation, Permits, Water pollution, Administration, Water quality, Marine animals, Aquatic life, Wildlife, Ecology, Fish, Legislation.

Under this proposed legislation the Administrator of the Environmental Protection Agency, the Secretary of the Interior (acting through the United States Fish and Wildlife Service), and the Chief of Engineers of the United States Army shall establish standards controlling the deposit or discharge into ocean, coastal, and other waters of all industrial wastes, sludge, spoil, and all other materials that might be harmful to the wildlife or ecology of these waters. The standards may be enforced by any department, agency or instrumentality of the federal government or of any state government that issues a license, permit, or other authorization for any such activity in coastal waters. These standards shall be applicable to all of the departments, agencies, and instrumentalities of the federal government and to states and their agencies, including any person having authorization from such state agency. States may establish their own standards with respect to activity covered by the federal standard, where state standards are more stringent than the federal standards and provide adequate procedures for enforcement. Provisions are established for enforcement and punishment of violators. (Horwitz-Florida)
W71-11160

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO PROTECT THE NAVIGABLE WATERS OF THE UNITED STATES FROM FURTHER POLLUTION BY REQUIRING THAT SYNTHETIC PETROLEUM-BASED DETERGENTS MANUFACTURED IN THE UNITED STATES OR IMPORTED INTO THE UNITED STATES BE FREE FROM PHOSPHORUS.
House Bill 1088, 92d Cong, 1st Sess (1971). 9 p.

Descriptors: *Federal government, *Regulation, *Detergents, *Phosphates, Federal jurisdiction, Standards, Administration, Control, Pollution abatement, Water pollution sources, Phosphorus, Chemical wastes, Water pollution control, Legal aspects, Legislation, Inspection, Water policy, Water conservation, Water pollution, Public rights, Public health.

The Congress finds that the navigable waters of the United States are being irreparably polluted by excessive algae growth fertilized by phosphates discharged into such waters as constituents of synthetic petroleum-based detergents. To prevent further pollution Congress must regulate the phosphorus content of detergents which will eventually be discharged into navigable waters, but, because of the impossibility of determining and thereby effectively regulating only those detergents, it must regulate all detergents manufactured in or imported into the United States. Under this proposed legislation it shall be unlawful for any person to import into the United States or manufacture in this country any detergent containing phosphorus in quantities over the minimum level set by the Secretary of the Interior. To enforce this bill the Secretary is authorized to conduct examinations, inspections, and investigations to determine the phosphorus content of any detergent. Any detergent containing phosphorus in violation of this section shall be liable to seizure by process pursuant to libel jurisdiction for such action resting in the appropriate United States district court. Provisions are also made for disposal of condemned detergents by the Secretary. (Horwitz-Florida)
W71-11161

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE COASTAL WATERS OF THE UNITED STATES.
House Bill 1383, 92d Cong, 1st Sess (1971). 4 p.

Descriptors: *Federal government, *Pollution abatement, *Coasts, *Wildlife conservation, State governments, State jurisdiction, Federal jurisdiction, Water pollution control, Legal aspects, Regulation, Permits, Standards, Water pollution, Administration, Water quality, Marine animals, Aquatic life, Wildlife, Ecology, Fish, Administrative agencies, Coordination, Legislation, Nonstructural alternatives.

This amendment to the Fish and Wildlife Coordination Act would authorize the Secretary of the Interior, acting through the United States Fish and Wildlife Service and in consultation with the Chief of Engineers of the United States Army, to establish standards applicable to the deposit or discharge into the coastal waters of the United States of all industrial wastes, sludge, spoil, and all other materials that might be harmful to the wildlife, wildlife resources, or ecology of these waters. Such standards are to be enforced by any department, agency, or instrumentality of the federal government or any state government that issues a license, permit, or other authorization for such activities. These standards shall be applicable to all of the departments, agencies and instrumentalities of the federal government and to states and their agencies. States may establish their own standards with respect to activities covered by the federal standards, but the state standards must be more stringent than the federal standards and must provide adequate procedures for enforcement. Provisions are also set forth to govern enofrcement and the punishment of violators. (Horwitz-Florida)
W71-11162

CITY OF BIRMINGHAM V NORWOOD (CITY'S LIABILITY FOR OBSTRUCTED SEWER).
126 So 616-619 (Ct App Ala 1930).

Descriptors: *Alabama, *Sewers, *Cities, *Floods, Flood damage, Surface waters, Surface runoff, Storm runoff, Storm drains, Obstruction to flow, Damages, Adjudication procedure.

Plaintiff homeowner sought to recover damages from defendant city for flood damage. The storm sewer outside plaintiff's house became obstructed and caused surface water to overflow into the cellar of plaintiff's home. Plaintiff lived in a section of defendant city which had previously been another municipality, but was absorbed by defendant. The sewer had been constructed by the other city. After holding that defendant was obligated to reasonably maintain the sewer not-withstanding its construction by another city, the Alabama Court of Appeals held that an allegation of notice to defendant of the sewer defect was necessary where the damage resulted from an obstructed sewer. One of the counts in the complaint was held to allege the requisite notice, but the other failed for insufficient allegation of notice. (Hart-Florida)
W71-11163

GENERAL WATER QUALITY CRITERIA AND SPECIFIC WATER QUALITY STANDARDS.
Maryland Water Resources Commission, Annapolis, Md.; and Maryland Dept. of Water Resources, Annapolis.

April 1969. 35 p.

Descriptors: *Maryland, *Water quality, *Standards, *Water quality control, Water pollution, Water pollution sources, Pollution abatement, Pollutants, Bacteria, Thermal pollution, Dissolved oxygen, Sewage sludge, Sewage effluents, Sewage disposal, Oil, Regulation, Commercial shellfish, Water supply, Municipal water, Industrial water, Recreation, Fish conservation, State governments, Legal aspects, Water pollution control.

In order to provide for the enhancement of water quality, to protect reasonable water uses, and to control nuisance conditions, water quality standards are hereby established for all waters of the state. Waters shall at all times be free from sewage contributing to sludge deposits or nuisance, floating debris and oil, and toxic concentrations. Allowable levels of dissolved oxygen, pH, and temperature in all waters are listed. Existing regulations concerning water pollution control are implemented and enforced as part of the general standards program. Categories of water uses include shellfish harvesting, public water supply, recreation, propagation of fish and other aquatic wildlife, agricultural water supply, and industrial water supply. These categories are combined to form three groups of water uses. Specific criteria for each group are set forth, including bacteriological, chemical, and temperature standards. A listing is made of water quality standards for specified waters or water zones, arranged by counties. (Smiljanich-Florida)
W71-11165

LAWS AND PROCEDURES OF POWER PLANT SITING IN NEW ENGLAND.
New England River Basins Commission, Boston, Mass.

Power and the Environment, Report No 1, New England River Basins Comm, Boston, Mass (1970). 133 p, 5 append.

Descriptors: *New England, *Sites, *Administrative agencies, *Permits, Damsites, Zoning, State governments, Local governments, Federal government, Administrative decisions, Interstate commissions, Interstate rivers, River basin commissions, Navigable rivers, Nuclear energy, Nuclear powerplants, Hydroelectric plants, Hydroelectric project licensing, Legislation, Federal Power Act, Hydroelectric power.

Endeavoring to achieve more efficient and proper site selection of power plants in New England, this publication discusses the various laws and procedures presently being used for approval of powerplant sites. The role of public utility commissions in issuing certificates of necessity, approving financing arrangements, and pre-empting local zoning laws is first considered. Additionally, natural resources agencies are responsible for furnishing permits for thermal discharges, dredging and filling in both navigable waters and marshlands, atmospheric emissions, and occupation of navigable airspace. Despite the comprehensive state site selection procedures, federal regulation still preempts state action in some areas. The Federal Power Commission has exclusive control over authorizations to generate hydroelectrical power for sale in interstate commerce, while the Atomic Energy Commission must authorize use of nuclear energy to generate electricity. Case studies of site selection of a fossil fuel steam plant, a hydroelectric plant, and a nuclear steam plant are provided. Problems in the licensing process are next considered. Finally, various improvements and alternatives to present site selection methods are suggested. (Hart-Florida)
W71-11166

DISPOSAL SYSTEMS AND HEARINGS (RELATING TO WATER POLLUTION CONTROL).
South Carolina Pollution Control Authority, Columbia.

Regulation PC-W-1, (1967). 2 p.

Descriptors: *South Carolina, *Waste water disposal, *Water pollution control, Regulation, Legislation, Legal aspects, Sanitary engineering, Waste disposal, Permits, Public health, Administration, Adoption of practices, Pollution abatement, Water pollution, Environmental engineering, Wastes, Administrative agencies, Administrative decisions, Public rights, Waste water (Pollution), Waste water treatment.

Applications for permits, plans, and specifications for : (1) operating new disposal systems, (2) altering or adding to existing systems, (3) placing new or altered systems into operation, or (4) increasing the load on any receiving stream by added discharge through an existing system shall be submitted to the combined Sanitary Engineering Division of the State Board of Health and Pollution Control Authority. The regulation provides for public notice, in a newspaper of general circulation, of all hearings on matters relating to water pollution. If the matter concerns more than one county, publication must be in a newspaper circulated within the area concerned. Where the matter is of state-wide concern, notice shall be in newspapers published in several large cities. A record of the testimony given under oath at the hearings shall be taken. Any interested party may submit a brief at the hearings. After the hearings, the examiners must submit a report to the Pollution Control Authority. The Authority must make a decision within six months of receiving the report. Appeals from final orders are allowed. Any person may request a hearing or rehearing. (Gallagher-Florida)
W71-11167

A REGULATION REQUIRING THE SUBMISSION OF ENGINEERING REPORTS AS A PART OF APPLICATIONS FOR THE DISCHARGE OF SEWAGE AND/OR INDUSTRIAL WASTES AND FOR THE CONSTRUCTION OR ALTERATION OF TREATMENT WORKS OR OUTLETS.
South Carolina Pollution Control Authority, Columbia.

Regulation PC-W-2, South Carolina Pollution Control Authority, Columbia, SC (1967). 3 p.

Descriptors: *South Carolina, *Waste disposal, *Treatment facilities, *Water quality control, Permits, Water pollution control, Standards, Construction, Regulation, Legislation, Legal aspects, Project feasibility, Sewage, Industrial wastes, Administrative agencies, Administrative decisions, Waste water (Pollution), State governments.

Before discharging sewage, increasing present discharges of sewage or industrial wastes, or constructing a new disposal system, an engineering report shall be submitted to the Pollution Control Authority. This report shall be prepared by a properly qualified engineer and describe the proposed work, its purposes, and the steps which will be taken to control water pollution. The report shall contain: (1) a brief description of the proposed project and its location; (2) the volume and concentration of waste discharged and the effect of the proposed project; (3) an estimate of the extent to which waste quality will be improved by the project; (4) a description of the treatment works including plans and specifications; (5) the receiving stream's minimum weekly flow rate; and (6) the effect of the proposed discharge on the receiving stream's quality in relation to its specified class. Upon approving the report, the Authority shall issue a permit subject to conditions deemed necessary. (Gallagher-Florida)
W71-11168

STATUTORY POLLUTION CONTROL IN PENNSYLVANIA,
Edward R. Paul, and Michael J. Shepard.
Villanova Law Review, Vol 16, No 5, p 851-894 (1971). 44 p, 264 ref.

Descriptors: *Pennsylvania, *Air pollution, *Water pollution control, *Administrative agencies, Permits, Water quality, Water quality control, Water pollution, Water pollution effects, Water pollution sources, Public health, Pollution abatement, Legislation, State governments, Waste disposal, Municipal wastes, Sewage treatment, Financing, Waste water (Pollution), Mine wastes, Industrial wastes, Waste treatment.

In response to the necessity for a total environmental program, Pennsylvania has created the Department of Natural Resources. The Department will centralize control of pollution, centralize enforcement efforts, and formulate coordinated pollution control policies. New legislation, including the Air Pollution Act and Clean Streams Act, also combats pollution. The Air Pollution Act strives to protect air quality to the extent necessary to protect health and the environment. The Clean Streams Law prohibits discharge of municipal sewage without a permit. Permits will be issued when the discharger demonstrates that the Law will not be violated. Additionally, the Clean Streams Law has a comprehensive plan for municipal sewage pollution prevention; the Law authorizes issuance of revenue bonds to finance treatment facilities. Discharge of industrial wastes without a permit is also prohibited by the Law. If private corporations require additional land to treat wastes, the Law provides them the right of eminent domain. The Clean Streams Law also governs pollution from operating and abandoned mines. Pollution may be abated under the Law, and penalties may be imposed. Administrative enforcement through civil penalties is also available. The Law might also be enforced, however, either by judicially imposed civil fines or through private remedies. (Hart-Florida)
W71-11169

THE USE OF PRIVATE ACTIONS TO CONTROL ENVIRONMENTAL POLLUTION IN PENNSYLVANIA,
Michael J. Shepard.
Villanova Law Review, Vol 16, No 5, p 920-954 (1971). 35 p, 195 ref.

Descriptors: *Pennsylvania, *Water pollution control, *Air pollution, *Legal aspects, Water pollution, Judicial decisions, Damages, Remedies, Water quality control, Public rights, Relative rights.
Identifiers: *Nuisance.

Three private actions are available to control environmental pollution in Pennsylvania: (1) private nuisance; (2) public nuisance; and (3) trespass. The private nuisance theory is particularly applicable to air and water pollution. Recovery in an action for private nuisance is premised upon defendant's intentional and unreasonable invasion of plaintiff's property right or privilege; substantial harm to plaintiff must be the legal result of defendant's acts. Under some circumstances, however, unintentional invasions may be actionable. Statutory standards for reasonableness would render private nuisance remedies more certain. The remedy sought may be money damages or an injunction. Damages may be sought whether the injury is temperory or permanent, and, where several polluters are involved, they may be jointly and severally liable. Several defenses are available to the polluter, including prescription, agreement, plaintiff's taking of property subject to the nuisance, and laches. Public nuisance will only lie for interference with public rights, and redress may be sought only by a public official, unless a private plaintiff can show special injury. If a cause of action is too difficult to establish under nuisance theory, a trepass action may lie for causing pollution to be carried onto another's land. (Hart-Florida)
W71-11170

NEW YORK STATE ENVIRONMENTAL FACILITIES CORPORATION ACT.

New York Public Authorities Law, secs 1280 thru 1298 (McKinney Supp 1970).

Descriptors: *New York, *Environmental sanitation, *Treatment facilities, *Construction, Operation and maintenance, Water works, Storm drains, Sewage treatment, Air pollution, Pollution abatement, Financing, Project planning, Cities, Public utilities, Sewers, Water pollution, Water pollution control, Contracts, Waste disposal, Solid wastes, Administrative agencies, Administration.

The New York State Pure Waters Authority is reconstituted and continued as the Environmental Facilities Corporation. The corporate purposes are to plan, finance, construct, maintain and operate: (1) sewage treatment works, (2) sewage collecting systems, (3) air pollution control facilities, (4) water management facilities, (5) storm water collecting systems, and (6) solid waste disposal facilities on behalf of municipalities and state agencies. To achieve these purposes, the corporation possesses specified general and special powers. The construction, operation and maintenance of air pollution control facilities, water management facilities, and storm water collecting systems are governed by a separate section. Other sections of the Act deal with: (1) acquisition and disposition of real property, (2) construction contracts with municipalities, (3) co-operation with and assistance of other agencies, (4) transfer of officers and employees, (5) notes and bonds of the corporation, (6) reserve funds and appropriations, (7) the state's agreement not to limit the obligations of the corporation, (8) the state's right to require redemption bonds, (9) remedies of noteholders and bondholders, (10) exemption from taxation, and (11) actions against the corporation. (Gallagher-Florida)
W71-11171

CONNECTICUT (ANALYSIS AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE WATER POLLUTION LAW),
Frank E. Maloney.
In: The 1971 Water Pollution Study for the State of Tennessee, Append 9 (1971). 25 p, 2 tab.

Descriptors: *Connecticut, *Water pollution control, *Administrative agencies, *Pollution abatement, Water resources development, State governments, Local governments, Legislation, Legal aspects, Judicial decisions, Water quality control, Permits, Standards, Effluents, Administration, Sewage disposal, Financing, Tennessee, Regulation.

Connecticut's water pollution control law is designed to: (1) give financial assistance to municipalities and industry for pollution abatement, (2) authorize the Water Resources Commission to control all sources of water pollution, and (3) authorize the Commission to set water quality standards and to make the communities eligible for additional federal aid. The Commission's jurisdiction over polluters does not extend to municipalities. This exclusion, however, is not fatal to its effectiveness, because Connecticut law specifically provides that no municipality may cause water pollution or discharge waste in violation of the law. Because of a broad definition of pollution, the Commission may require abatement of pollution regardless of the quality of the water into which the waste is being released. The Commisssion has no specific authority to classify water. Connecticut is an effluent-standard state, and the applications of the standards are enumerated. Financial incentives, such as exemption from local proper taxes for industry and special tax write offs for corporations, are provided. The Commission has wide enforcement powers, such as issuance of orders, entry onto property, and issuance of permits. Two tables compare Connecticut law with the present and proposed water pollution control law of Tennessee. (Shelnut-Florida)
W71-11172

DELAWARE (ANALYSIS AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE WATER POLLUTION LAW),
Frank E. Maloney.
In: The 1971 Water Pollution Study for the State of Tennessee, Append 10 (1971). 16 p, 2 tab.

Descriptors: *Delaware, *Water pollution control, *Administrative agencies, *Water resources development, Pollution abatement, Air pollution, Permits, Legal aspects, Legislation, Judicial decisions, Delaware River Basin Commission, Administration, Regulation, Tidal marshes, State governments, Local governments, Tennessee, Water pollution, Administrative decisions.

Delaware's pollution control act creates an integrated environmental agency which is responsible for air and water pollution control and water resources. Delaware is a member of the interstate Delaware River Basin Commission and as a coastal state regulates the use of its tidal and underwater lands. While the agency represents centralized power and responsibility, it is advised in different capacities by three commissions. Thus its organization is characterized by confusion and complexity. The statute is vague concerning the agency's procedures, and makes no reference to water quality standards, financial incentives, or provisions in aid of municipalities experiencing financial hardship. Although there is no provision for a permit system, the general provisions would allow issuance of permits, leases, and variances. Special orders appear to be the principal method of enforcement. The statute provides an adequate capability for making inspections and conducting investigations. However, enforcement provisions are not activated until the existence of pollution is established, except where an emergency exists. The enforcement procedures allow for delay and do not provide strong sanctions to be used against violators. First, compliance is sought by conciliation and persuasion. Failing this, the agency may issue orders or conduct hearings. Two tables compare water pollution control law in Delaware to proposed and present law of Tennessee. (Shelnut-Florida)
W71-11173

GEORGIA (ANALYSIS AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE WATER POLLUTION LAW),
Frank E. Maloney.
In: The 1971 Water Pollution Study for the State of Tennessee, Append 12 (1971). 15 p, 2 tab.

Descriptors: *Georgia, *Water pollution control, *Administrative agencies, *Pollution abatement, Water quality control, Financing, State governments, Standards, Local governments, Legislation, Legal aspects, Judicial decisions, Permits, Sewage disposal, Administration, Water pollution, Administrative decisions, Tennessee.

Georgia's pollution control statute reflects the desire for federal, state, and local cooperation in alleviating water pollution problems. Its objective is to clean up the state's waters in the manner least offensive to the state's industries, with due consideration for the complex technical and economic factors involved. The law adopts the modern definition of pollution, which defines the term as alteration of the waters rather than the discharge of wastes into the waters. Within the Department of Public Health, the Division for Water Quality Control is charged with the duty of using reasonable methods to control and reduce water pollution. The act requires polluters to obtain a permit in order to discharge wastes. A state agent may enter public or private property to investigate conditions relating to pollution. Information obtained by the board, however, is not admissible in evidence in private actions. All other provisions, such as those governing permits, orders, and hearings, are similar to provisions of most states. The penalties for violation of the act are not specifically stated. Persons owning property on which a body of water is located are exempted from the act's coverage. Two tables compare water pollution law in Georgia with present and proposed Tennessee law. (Shelnut-Florida)
W71-11174

ILLINOIS (ANALYSIS OF STATE WATER POLLUTION LAW AND COMPARISON WITH PRESENT AND PROPOSED TENNESSEE LAW),
Frank E. Maloney.
In: The 1971 Water Pollution Study for the State of Tennessee, Append 15 (1971). 19 p, 2 tab.

Descriptors: *Illinois, *Water pollution control, *Legislation, *Pollution abtement, Water pollution, Water pollution sources, Water quality control, Administrative agencies, State governments, Administration, Standards, Permits, Regulation, State jurisdiction, Supervisory control (Power), Remedies, Tennessee, Adjudication procedure, Administrative decisions, Legal aspects.

The Illinois Environmental Protection Act serves as a model for all to follow in its comprehensive approach to pollution control. There are three branches of the Pollution Control Agency: (1) the Environmental Protection Agency, empowered to survey and monitor discharges from contaminant sources, investigate violations of the Act, and administer the permit system; (2) the Pollution Control Board, whose duties are to implement environmental control standards and conduct hearings on violations; and (3) the Institute for Environmental Quality, which investigates practical problems, studies, and programs. Procedures of the various agencies are outlined. Criminal penalties in the Act are stringent. Allowance is made for actions by private citizens. Evaluation of the Act demonstrates its strengths in abating pollution. Its three most valuable aspects are: (1) the tri-partite division of administration, leading to thorough administrative regulation; (2) the fact that the top administrators are highly paid professionals; and (3) the citizen suit, giving the individual a weapon with which to fight pollution. The Act empowers the state to reach polluters outside its boundaries whose pollution affects the state's environment. Two tables provide comparisons with present and proposed Tennessee Law. (Smiljanich-Florida)
W71-11175

REGULATIONS FOR USE OF SECTION 169, INTERNAL REVENUE CODE.
Treas Reg secs 1.169-1 thru 1.169-4 and 1.179-1 (1971); Federal Register, Vol 36, No 96, p 9010-9017 (1971). 8 p.

Descriptors: *Taxes, *Amortization, *Pollution abatement, *Federal government, Water pollution control, Water pollution treatment, Air pollution, Water pollution, Government supports, Government finance, Quality control, Economics, Financing, Legal aspects, Regulation.

Treasury Rules and Regulations concerning section 169 of the Internal Revenue Code are established. The regulations include provisions for amortization of pollution control devices, amortization of pollution control facilities, and rules on amortizable basis. Included in these regulations are definitions, examples illustrating use of the section, and a description of the method to be used for electing section 169. (Horwitz-Florida)
W71-11176

OIL POLLUTION--JUDICIAL REACTIONS,
Peter J. Francese.
Suffolk University Law Review, Vol 5, No 3, p 1056-1070 (1971). 15 p, 102 ref.

Descriptors: *Oil, *Water pollution sources, *Pollution abatement, *Public rights, Oil industry, Oil fields, Oil wells, Offshore platforms, Ships, Water pollution control, Legal aspects, Legislation, Admiralty, Rivers and Harbors Act, Water pollution, Judicial decisions, Pollutants, Remedies, Damages.

By analyzing four recent cases, the author illustrates the current judicial approach to the problem of oil pollution. The cases indicate the chief oil pollution sources to be: (1) spillage from vessels, (2) blowouts at offshore platforms, and (3) on-shore spillage reaching the ocean. In a case involving vessel spillage, the basic issue was whether pollution was a tort within the United States admiralty jurisdiction, thus allowing a maritime lien against the vessel. In allowing the lien, the court relied heavily on public policy to avoid the unjust outcome which might occur if the injured party had to personally serve the owners, who are usually unknown or inaccessible. In one case where a county prosecutor attempted to halt off-shore drilling, the federal district court enjoined this action as state interference in an area of exclusive federal jurisdiction. The author points out that while the injunction was proper, the court suggested that the state might still punish the polluter. In two other cases involving section 13 of the Rivers and Harbors Act, the courts rejected a strict technical construction of the Act on the basis of overriding public policy favoring easier prosecution of polluters. (Gallagher-Florida)
W71-11177

A SURVEY OF NATIONAL LAWS ON THE CONTROL OF POLLUTION FROM OIL AND GAS OPERATIONS ON THE CONTINENTAL SHELF,
Albert E. Utton.
Columbia Journal of Transnational Law, Vol 9, No 2, p 331-361 (1970). 31 p, 166 ref.

Descriptors: *Well regulations, *Oil wells, *Water pollution control, *International law, Oil, Oil industry, International waters, Water pollution sources, Oceans, Federal government, Legal aspects, Hydrogeology, Engineering geology, Geologic control, Foreign countries, Regulation, Legislation, Continental shelf, Marine geology, Standards, Water quality control, Specifications, Oil wastes.

The massive oil spill in 1969 off Santa Barbara, California, was a reminder of the need for effective regulation of potential sources of marine oil pollution, especially from offshore oil wells. Under general principles of international law, it appears that a nation may not utilize its continental shelf in such a way as to cause pollution of the territory of another. The 1958 Geneva Convention on the High Seas called on all states to promulgate regulations to prevent pollution of the seas. This article discusses the responses of many coastal states to this Convention; it concludes that most regulations are general and abstract. This generality allows wide discretion since the regulator is not given a standard to work with. Since the Santa Barbara oil spill, the regulations of the United States have been amended in order to tighten administrative control over supervision and raise safety standards. The article stresses the as yet largely unmet requisites for effective regulation of offshore wells, including: (1) adequate information, (2) sufficient quantity and quality of supervision, (3) rigorous technical standards, and (4) strict sanctions. (Johnson-Florida)
W71-11178

POLLUTION OF THE SEAS: OIL POLLUTION.
International and Comparative Law Quarterly, Vol 19, p341-343 (1970). 3 p.

Descriptors: *International waters, *Water pollution control, *Oil wastes, *Ships, International law, Water pollution, Pollution abatement, Oil, Oily water, Water pollution sources, International commissions, Oil industry, Treaties, Oceans, Coasts, Law of the sea, Legal aspects, Navigable waters, Foreign waters, Foreign countries, Disasters, Remedies, Non-structural alternatives.

After the Torrey Canyon disaster an International Legal Conference on Marine Pollution Damage was convened, and two conventions were subsequently adopted by this body. The International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties deals with the rights and obligations of coastal states in protecting themselves from oil pollution. The International Convention on Civil Liability for Oil Pollution Damage deals with the question of liability for pollution damage arising from maritime casualties. The International Legal Conference on Marine Pollution Damage also adopted the resolutions which are explained in this article. The Convention for the Prevention of Pollution of the Sea by Oil was amended in 1967. The Inter-Governmental Maritime Consultative Organization's recommendations to prevent and to deal with oil pollution are herein set forth. Seven oil companies have formed two companies to administer the Tanker Owner Voluntary Agreement Concerning Liability for Oil Pollution, and this plan will come into effect when 50% of the world's deadweight tonnage is covered. Eight European nations have signed an Agreement for co-operation in dealing with Pollution of the North Sea by Oil. (Robinson-Florida)
W71-11179

A BILL TO REQUIRE THE COUNCIL ON ENVIRONMENTAL QUALITY TO MAKE A FULL AND COMPLETE INVESTIGATION AND STUDY OF NATIONAL POLICY WITH RESPECT TO THE DISCHARGING OF MATERIAL INTO THE OCEANS.
House Bill 336, 92d Cong, 1st Sess (1971). 2 p.

Descriptors: *Federal government, *Water pollution, *Oceans, *Investigations, Administrative agencies, Legal aspects, Social aspects, Legislation, Water resources development, Public rights, Project planning, Regulation, Atlantic Ocean, Pacific Ocean, Gulf of Mexico, Pollution abatement, Water pollution control, Planning.

Under this proposed legislation the Council on Environmental Quality would make a full and complete investigation and study of all aspects of existing national policy with respect to the discharge of any material of any kind in any waters within the territorial sea and contiguous zone of the United States, as well as the Atlantic and Pacific Oceans and the Gulf of Mexico. Upon completion of such investigation and study the Council would report to the President and Congress the results thereof and its recommendations for a national policy with respect to discharges into such waters, including any treaties, agreements, and legislation necessary in connection therewith. (Horwitz-Florida)
W71-11180

DETERGENT POLLUTION CONTROL ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO BAN POLYPHOSPHATES IN DETERGENTS AND TO ESTABLISH STANDARDS AND PROGRAMS TO ABATE AND CONTROL WATER POLLUTION BY SYNTHETIC DETERGENTS).
House Bill 1385, 92d Cong, 1st Sess (1971). 14 p.

Descriptors: *Federal government, *Regulation, *Detergents, *Phosphates, Federal jurisdiction, Standards, Administration, Control, Pollution abatement, Water pollution sources, Phosphorus, Chemical wastes, Water pollution control, Legal aspects, Legislation, Inspection, Water policy, Water conservation, Water pollution, Public rights, Public health, Eutrophication.

This proposed legislation is designed to abate and control the pollution of surface and groundwaters by insuring that polyphosphates in synthetic detergents do not contribute thereto. To accomplish this goal the bill would make it unlawful after June 30, 1972, for any person to import into the United States or manufacture in the United States any detergent containing phosphorus. This ban on phosphorus in detergents is implemented by an elaborate system that empowers the Secretary of the Interior to inspect and test detergents to determine their phosphorus content. Elaborate enforcement provisions provide for the seizure and destruction of detergents in violation of this bill. The Secretary is also ordered to establish standards of water eutrophication ability, biodegradable, toxicity, and of effects on the public health and welfare which must be met by all synthetic detergents. Federal assistance to develop phosphorus-free detergents is established and funded. (Horwitz-Florida)
W71-11181

A BILL TO PROVIDE FOR REGULAR DETERMINATIONS OF THE EXTENT OF AIR AND WATER POLLUTION THROUGHOUT THE UNITED STATES.
House Bill 1609, 92d Cong, 1st Sess (1971). 2 p.

Descriptors: *Federal government, *Air pollution, *Water pollution, *Pollutant identification, Environmental sanitation, Legislation, Water law, Legal aspects, Water quality, Water quality control, Water resources, Pollutants, Water pollution sources, Administrative agencies, Public health, Navigable waters, United States, Investigations.

In recognition of the increasing air and water pollution in the United States, this bill would require that the Secretary of Commerce, through the National Oceanic and Atmospheric Administration, make daily determinations, in the area of each Weather Bureau Office, of the extent of pollutants dangerous to the public health and welfare which are present in the atmosphere. A like determination would be made as to the navigable waters of the United States. The results of such determinations would be made public. (Robinson-Florida)
W71-11182

DETERGENT ENZYME CONTROL ACT OF 1971 (A BILL TO PROHIBIT THE USE OF ENZYMES IN DETERGENTS).
House Bill 5775, 92d Cong, 1st Sess (1971). 5 p.

Descriptors: *Federal government, *Enzymes, *Detergents, *Water pollution control, Control, Legislation, Federal jurisdiction, Domestic wastes, Water pollution sources, Public health, Regulation, Administrative agencies, Administration, Standards, Inspection, Legal aspects, Supervisory control (Power), Pollution abatement, Wastes, Water quality control.

Enzyme ingredients recently added to presoak compounds and laundry detergents, this Bill states, have been found to pose serious and immediate health hazards to humans and may also act as disease carriers if they are not free of live spores. The term enzyme means any of the various organic substances that are produced in plant and animal cells and cause changes in other substances by catalytic action. It shall be unlawful after June 30, 1973 for any person to import into or manufacture in the United States any detergent formulation containing enzymes either purposefully added or not in compliance with regulations prescribed by the Administrator of the Environmental Protection Agency. Enforcement provisions herein established provide for: a fine of $5000 for the first offense and $20,000 for any subsequent offense, and seizure of the detergent by process pursuant to the order of a federal district court. The Administrator is authorized to conduct examinations, inspections, and investigations pursuant to the Bill's provisions. (Horwitz-Florida)
W71-11183

A BILL TO AMEND SECTION 4 OF THE ACT OF MARCH 3, 1965, TO PROHIBIT THE DUMPING OF CERTAIN SPOIL INTO THE GREAT LAKES.
House Bill 1058, 92d Cong, 1st Sess (1971). 2 p.

Descriptors: *Great Lakes, *Dredging, *Waste disposal, *Sediment discharge, Spoil banks, Legislation, Soils, Water pollution sources, Water quality control, Water pollution control, Federal government, Administrative agencies.

Dumping or permitting the dumping of dredging spoils, earth, or other refuse into the Great Lakes by the Secretary of the Army or any other official or agency of the government is prohibited by this proposed legislation. Authorized dumping areas previously established are abolished. (Hart-Florida)
W71-11184

A BILL TO AMEND THE ACT OF AUGUST 1, 1958, TO AUTHORIZE RESTRICTIONS AND PROHIBITIONS ON THE USE OF INSECTICIDES, HERBICIDES, FUNGICIDES, AND PESTICIDES WHICH POLLUTE THE NAVIGABLE WATERS OF THE UNITED STATES.
House Bill 1563, 92d Cong, 1st Sess (1971). 2p.

Descriptors: *Water pollution control, *Administrative agencies, *Pesticides, *Herbicides, Administrative decisions, Fungicides, Insecticides, Agricultural chemicals, Pesticide toxicity, Environmental sanitation, Legislation, Navigable waters, Federal government, Federal jurisdiction, United States.

Under this proposed legislation, the Secretary of the Interior is authorized to restrict or prohibit the use of any pesticides, insecticides, herbicides, or fungicides which he determines result in the pollution of navigable waters of the United States. Such restrictions or prohibitions shall be for the time period, and under conditions, designated by the Secretary. (Hart-Florida)
W71-11185

A BILL TO PROHIBIT THE DISCHARGE INTO ANY OF THE NAVIGABLE WATERS OF THE UNITED STATES OR INTO INTERNATIONAL WATERS OF ANY MILITARY MATERIAL OR OTHER REFUSE WITHOUT A CERTIFICATION BY THE ENVIRONMENTAL PROTECTION AGENCY APPROVING SUCH DISCHARGE.
House Bill 4217, 92d Cong, 1st Sess (1971). 2p.

Descriptors: *Waste disposal, *Permits, *Administrative agencies, *Military aspects, Biological warfare, Chemical warfare, Navigable waters, International waters, Nuclear wastes, Federal government, Legislation, Administrative decisions.

No person shall directly or indirectly discharge any munition; or any chemical, biological, or radiological warfare agent; or other military material into the navigable waters of the United States or any international waters except in accordance with a certificate issued by the Environmental Protection Agency under the terms of this proposed legislation. (Hart-Florida)
W71-11186

A BILL TO AMEND THE ACT OF AUGUST 3, 1968 (82 Stat 625), TO PROTECT THE ECOLOGY OF ESTUARINE AREAS BY REGULATING DUMPING OF WASTE MATERIALS, TO AUTHORIZE THE ESTABLISHMENT OF A SYSTEM OF MARINE SANCTUARIES, AND FOR OTHER PURPOSES.
House Bill 4359, 92d Cong, 1st Sess (1971). 10 p.

Descriptors: *Federal government, *Waste disposal, *Permits, *Estuarine environment, Administrative decisions, Oceans, Estuaries, Intertidal areas, Environmental effects, Ecology, Environment, Administrative agencies, Waste treatment, Tertiary treatment, Nuclear wastes, Water pollution treatment, Legislation, Federal jurisdiction.

By regulating the dumping of wastes and authorizing the establishment of a marine sanctuary system, this proposed legislation would protect the ecology of estaurine areas. Permits for the dumping of wastes into oceans, coastal waters, or estuaries are required. The Environmental Protection Agency may issue permits under terms necessary to ensure that marine ecology will be undamaged. The following factors will be considered in granting permits: (1) environmental impact; (2) irreversability of the impact; (3) volume and concentration of materials involved; and (4) location of disposal, depth, and relative location impact. Permits may not be issued for radioactive wastes, toxic industrial wastes, or chemical and biological warfare materials. Wastes discharged after 1 January 1972, 1974, and 1976 must have primary, secondary, and tertiary treatment, respectively. Disposal of any waste material deemed detrimental to the environment may be prohibited. Violations of the Act would be a criminal offense. The Act would be enforceable by the Coast Guard, and federal district courts may restrain violations. Marine sanctuaries, in which waste disposal or mineral exploration or exploitation are prohibited, will be designated by the Secretary of Commerce. (Hart-Florida)
W71-11187

A BILL TO PROHIBIT OFFICERS AND EMPLOYEES OF THE UNITED STATES FROM DUMPING OR PERMITTING THE DUMPING OF DREDGINGS AND OTHER REFUSE MATERIALS INTO ANY NAVIGABLE WATER.
House Bill 5885, 92d Cong, 1st Sess (1971). 2 p.

Descriptors: *Waste disposal, *Navigable waters, *Dredging, *Water pollution control, Pollutants, Pollution abatement, Administrative agencies, Water quality, Water quality control, Water pollution sources, Legislation, Regulation, Administration, Wastes.

This proposed amendment to 33 United States Code 419 would prohibit officers and employees of the United States from dumping or permitting the dumping of dredgings or other refuse into any navigable water. (Hart-Florida)
W71-11188

A BILL TO AMEND THE ACT OF JUNE 29, 1888, RELATING TO THE PREVENTION OF OBSTRUCTIVE AND INJURIOUS DEPOSITS IN THE HARBOR OF NEW YORK, TO PROVIDE FOR THE TERMINATION OF CERTAIN LICENSES AND PERMITS.
House Bill 5835, 92d Cong, 1st Sess (1971). 2 p.

Descriptors: *Water pollution control, *Permits, *Administrative agencies, *Pollution abatement, Waste disposal, Sewage, Sludge disposal, Water quality, Water quality control, New York, Federal government, Legislation, Regulation, Harbors.

To prevent injurious deposits in New York Harbor, this proposed amendment to 33 United States Code 443-448 directs the Secretary of the Army to terminate any license or permit to discharge any sewage, sludge, spoil or other waste into New York Bight or any waters within 25 miles of Ambrose Lighthouse. Furthermore, the Secretary is directed to conduct and submit to Congress a study to determine the methods and cost of restoring these waters to their natural state. (Hart-Florida)
W71-11189

THE MERCURY POLLUTION CONTROL ACT (A BILL).
House Bill 7341, 92d Cong, 1st Sess (1971). 4 p.

Descriptors: *Water pollution control, *Waste disposal, *Water pollution sources, *Federal government, Permits, Administrative agencies, Chemical wastes, Heavy metals, Navigable waters, Legislation, Pollution abatement, Water pollution, Federal jurisdiction, Ships.
Identifiers: *Mercury pollution.

The Federal Water Pollution Control Act would prohibit mercury pollution under this proposed legislation entitled the Mercury Pollution Control Act. The Bill prohibits the discharge of mercury into navigable waters of the United States, adjoining shorelines, and the contiguous zone, unless under permit. Vessels or persons having knowledge of a prohibited discharge are required to immediately notify the appropriate administrative agency; failure to give such notification is punishable by fine and imprisonment. A civil penalty of $10,000 is imposed for knowingly discharging mercury. Each violation is a separate offense, and the civil fine may be compromised. Notice and opportunity for hearing are afforded a person charged with illegal pollution. Furthermore, a criminal penalty of a $10,000 fine and 1 year imprisonment are provided for knowingly discharging mercury in violation of the Bill. Definitions are furnished for the following terms: (1) mercury, (2) discharge, (3) vessel, (4) United States, (5) owner or operator, (6) person, (7) contiguous zone, (8) onshore facility, and (9) offshore facility. (Hart-Florida)
W71-11190

A BILL TO AMEND THE ACT OF MARCH 3, 1905, TO EXTEND THE AUTHORITY OF THE SECRETARY OF THE ARMY OVER TRANSPORTING AND DUMPING MATERIALS IN CERTAIN WATERS AND FOR OTHER PURPOSES.

House Bill 7052, 92d Cong, 1st Sess (1971). 6 p.

Descriptors: *Waste disposal, *Permits, *Administrative agencies, *Oceans, Ultimate disposal, Wastes, Federal government, Federal jurisdiction, Supervisory control (Power), Legislation, Administrative decisions, Regulation.
Identifiers: Injunction (Prohibitory).

Under this House Bill the authority of the Secretary of the Army would be extended to the transporting and dumping of materials in oceans, coastal waters, and other waters. This is accomplished by permitting the Secretary to seek appropriate relief in a federal district court. The penalty for violation of regulations promulgated pursuant to the Act is fine and imprisonment; each day's violation is a separate offense. Furthermore, the Attorney General may seek equitable relief for violation of such regulations. Vessels shall be liable in rem for violations, but no vessels shall be liable unless the owner consented or was in privity to the violation. If the provisions of a permit issued under the Act are violated the Secretary may revoke or suspend the permit after notice and hearing. Various definitions are furnished in the proposed amendment: (1) oceans, coastal, and other waters; (2) material; (3) United States; (4) person; (5) dumping; and (6) district court of the United States. (Hart-Florida)
W71-11191

SANTA BARBARA CHANNEL MORATORIUM AND ECOLOGICAL PRESERVE ACT (A BILL TO PROVIDE FOR A FEDERAL ECOLOGICAL PRESERVE IN A PORTION OF THE OUTER CONTINENTAL SHELF IN THE SANTA BARBARA CHANNEL, TO PROVIDE FOR A MORATORIUM ON DRILLING OPERATIONS, AND FOR OTHER PURPOSES).

House Bill 2637, 92d Cong, 1st Sess (1971). 9 p.

Descriptors: *Oil industry, *Continental shelf, *Drilling, *Water pollution control, Offshore platforms, Oil fields, Water pollution sources, Water pollution, Pollution abatement, Ecology, Preservation, Conservation, Area redevelopment, Technology, Water pollution effects, Environmental effects, Legal aspects, Legislation, Operations, Control, Leases, Rents, Federal government, Navigable waters.

The purposes of this Bill are to provide for: (1) a federal ecological preserve in a portion of the Outer Continental Shelf in the Santa Barbara Channel, (2) a moratorium on drilling operations in the area pending the ability to control and prevent pollution by oil discharges, and (3) the improvement of the technology in oil production from submerged lands. While authorizing an action for just compensation, the Bill terminates certain leases and designates such areas as an ecological preserve. Procedures for paying compensation judgments from specified financial sources are established. Drilling on leases listed in the Bill is suspended until the Secretary of the Interior finds that drilling in such an area can be accomplished without the risk of pollution or hazards to navigation. In making this finding, the Secretary must insure that certain stated criteria are met. Other provisions provide for: (1) extension of the suspended leases and waiver of rents during suspension, (2) unitization of certain leases to minimize possible pollution, (3) prohibition of further platform construction, and (4) removal of platforms that can be replaced by underwater drilling units. (Gallagher-Florida)
W71-11192

OPERATION OF MOTORBOATS.
California Harbors and Navigation Code, sec 660 (West Supp 1971).

Descriptors: *California, *Water resources development, *Boating regulations, *Water rights, Legislation, Legal aspects, State governments, Water law, Regulation, Planning, Administration, Coordination, Ships, Boating, Water utilization, Recreation, Fishing, Jurisdiction.

The provisions of this chapter govern the operation, equipment, and all other matters relating thereto whenever any motorboat or vessel shall be operated on the waters of this state. Nothing in this chapter should be construed to prevent the adoption of any law by any entity authorized to adopt such measure, as concerns operation of a vessel, so long as such measures do not conflict with the provisions of this chapter or regulations of the Department of Navigation and Ocean Development. The Department is authorized to make special regulations concerning the operation of boats on any body of water that lies within two political subdivisions when no special regulations exist or uniformity in such special regulations is required. Such regulations may include provisions relating to sanitation and pollution control. Any entity

authorized to adopt measures concerning the operations of boats may adopt emergency regulations. This may be done when necessary to insure the safety of persons and property threatened because of disaster or other public calamity. Such emergency regulations may remain in effect for not more than sixty days unless the Department authorizes differently. (Johnson-Florida)
W71-11193

REMOVAL OF MATERIAL (FROM BED OR BANKS OF STATE WATERS).
Oregon Revised Statutes secs 541.605 thru 541.990 (1969).

Descriptors: *Oregon, *Bank protection, *Beds, *Excavation, Supervisory control (Power), Streambeds, Banks, Streams, River beds, Lake beds, Beds under water, Ownership of beds, Control, Dredging, Channel improvement, Civil engineering, Legal aspects, Water law, Legislation, Administrative agencies, State governments, Regulation, State jurisdiction, Permits.

The intent of these sections is to centralize control over the removal of material from the beds and banks of state waters for the purpose of protecting the state's water resources. A permit, issued at the discretion of the Director of the Division of State Lands, is required to remove 50 cubic yards or more of material. The permit may be conditioned by the Director if issued in conformity with rules of the Water Resources Board. Application procedures, appeal procedures, and fees are herein set forth. Removal of materials without or contrary to the conditions of a permit is declared a public nuisance. Enforcement power is vested in the State Water Resources Board. The Board may investigate, conduct hearings, publish findings, revoke permits, issue orders, and institute civil abatement proceedings. Criminal penalties are herein provided. (Madsen-Florida)
W71-11194

DEFINITION OF NUISANCE AND PENALTY.
Revised Statutes of Nebraska sec 28-1016 (Supp 1969).

Descriptors: *Nebraska, *Public health, *Water pollution control, *Water quality control, Water pollution, Regulation, Pollution abatement, Impaired water quality, Water quality, Legal aspects, Navigable rivers, Streams, Watercourses, Navigable waters, Legislation, State jurisdiction, Public rights, Non-structural alternatives.

The following acts are herein deemed to be a nuisance: (1) obstructing or impeding, without legal authority, the passage of any navigable river, harbor, or collection of water; (2) polluting any watercourse, stream, or water so that the same is rendered unwholesome or impure; and (3) unlawfully diverting any watercourse from its natural course to the injury or prejudice of others. Any action deemed a nuisance is considered an offense against the public health and safety and constitutes a crime punishable in any sum not exceeding five hundred dollars. (Horwitz-Florida)
W71-11195

BOATING REGULATIONS.
North Dakota Century Code Ann secs 61-27-02 thru 61-27-04 (Supp 1969).

Descriptors: *North Dakota, *Boating regulations, *Boats, *Administrative agencies, State governments, Legislation, Wildlife management, Inspection, Water pollution, Pollution abatement, Multiple-purpose projects, Decision making, Boating, Administrative decisions, Regulation, Standards.

An operation certificate is required for all watercraft propelled by a motor having ten or more horsepower used on any waters within the state. This certification program is administered by the Game and Fish Department. Life preservers, lights, and a gas ventilation system are express conditions to certification. However, the Department, through its regulatory power, may require such additional equipment as it may find appropriate to promote the safety of navigation and persons. (Kohla-Florida)
W71-11196

POLLUTION OF WATER CONTAINING FISH.
Colorado Revised Statutes, 1963 Ann secs 62-5-13, 62-5-15 (1963).

Descriptors: *Colorado, *Water pollution sources, *Fishkill, *Water pollution control, Water pollution, Pollutants, Wastes, Sawmills, Toxins, Mining, Toxicity, Water quality, Water quality control, Aquatic environment, Fish reproduction, Spawning, Water pollution effects, Pollution abatement, Administrative agencies, Judicial decisions, Obstruction to flow.

This statute provides that no sawdust, tailings, or any other deleterious or poisonous substance shall be allowed to enter or pollute any public water containing fish. Nor may such a substance be deposited where it may be carried by natural causes into such waters in such quantities as to destroy or harm the fish or spawn therein. It is further provided that any citizen, operator or owner of an industry, or the Game, Fish, and Parks Commission may file a petition for abatement in the district court in the county where pollution or an obstruction to flow exists. Following an equitable determination of the fact, nature, and extent of the obstruction or pollution, a temporary injunction may be issued. (Rees-Florida)
W71-11197

LICENSING--CONSTRUCTION OF SEPTIC TANKS.
Colorado Laws 1970, ch 61, p 214 amending Colorado Revised Statutes secs 66-28-2, 66-28-8.

Descriptors: *Colorado, *Septic tanks, *Standards, *Permits, Sewage disposal, Domestic wastes, Organic wastes, Public health, Pollution abatement, Waste disposal, Water pollution control, Legal aspects, Legislation, Regulation, Construction, Sanitary engineering.

The Water Pollution Control Commission shall have the power to require as well as issue or deny written authorizations for the construction and use of septic tanks in any area of the state where unregulated outflow from septic tanks might pollute the waters. The Commission shall identify each area where authorization is required and determine the terms and conditions for septic tank construction, design, maintenance, spacing and location for each particular area. This amendment is necessary for the immediate preservation of the public peace, health, and safety. (Gallagher-Florida)
W71-11198

PENALTIES FOR POLLUTION OF WATER BY RADIOACTIVE, TOXIC OR OTHER WASTES AND BY CAMPING AND RECREATION WASTES.
Colorado Laws 1970, ch 62, p 215-217, amending Colorado Revised Statutes sec 66-28-9.

Descriptors: *Colorado, *Water pollution control, *Waste disposal, *Administrative agencies, Public health, Water pollution sources, Wastes, Radioactive wastes, Toxins, Recreation wastes, Waste treatment, Domestic wastes, Pollution abatement, Investigation, Permits, Oil wells, Injection wells, Surface drainage, Irrigation systems, Septic tanks, Underground, Liquid wastes, Explosives, Regulation, Legislation.

This Act makes unlawful the underground disposal of radioactive, toxic, or other wastes in liquid or explosive form, unless after a hearing and investigation the Water Pollution Control Commission concludes that a proposed disposal poses no pollution threat or only minor pollution justified by the activity's public purpose and limited to a specified area. A written permit for the activity may include conditions respecting the duration of use, volume of discharge, treatment methods, and deposit of a surety bond. Oil and gas wells, water injection wells, septic tanks, and irrigation and water transportation systems are excluded from the coverage of the Act. Violation constitutes a misdemeanor punishable by fine from $50 to $2500 per day that the violation occurs. The disposal of recreation, camping, and boating wastes into the waters of the state or within one hundred feet thereof is unlawful. Sanitary sewage discharges are excluded from coverage. Violation constitutes a misdemeanor punishable by a $25 fine. (Rees-Florida)
W71-11199

CONTROL OF OIL PRODUCTION POLLUTION,
Charles Taylor Ashworth, and Emily Calhoun.
Texas Law Review, Vol 48, No 6, p 1086-1129 (1970). 44 p, 256 ref.

Descriptors: *Texas, *Water pollution control, *Administrative agencies, *Oil industry, Brine disposal, *Oil wastes, Legal aspects, Water law, Administration, Regulation, Water pollution, Water quality, Water quality control, Pollution abatement, Oily water, Oil wells, Natural gas, Brines, Saline water, Economics, Supervisory control (Power), Federal jurisdiction, State jurisdiction, Legislation.

The Texas Railroad Commission has exclusive statutory authority to control water pollution arising from oil production in Texas. The Commission's response to that authority is examined in this article in relation to the pollution of inland waters, offshore waters, and estuaries. Specific regulations of the Commission are related to the problems created by: (1) marginal producers, (2) water quality standards, (3) General Land Office regulations, (4) pipeline regulations, (5) federal regulations, and (6) overlapping jurisdictions. Penalties and other remedial measures for oil production pollution are explained and evaluated. Suggestions are presented for the improvement of the Texas Emergency Oil Spill Plan. The administrative procedures utilized in Commission hearings are evaluated. The authors conclude that the Commission's present role as a promoter of the oil industry is inconsistent with its regulatory functions. Three alternative solutions are presented to improve the regulation of water pollution by oil producers in Texas. The authors suggest the creation of a supervisory policy-making board which would review the Commission's activities but continue to utilize its expertise. (Robinson-Florida)
W71-11200

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, AND FOR OTHER PURPOSES.
House Bill 5962, 92d Cong, 1st Sess (1971). 14 p.

Descriptors: *Sewage disposal, *Treatment facilities, *Construction, *Government finance, Water pollution, Water pollution control, Pollution abatement, Water quality control, Sewage, Costs, Financing, Grants, Legislation, Legal aspects, Financial feasibility, Standards, Water quality, Administrative agencies, Operation and maintenance, Project feasibility, Allotments, Planning, Adoption of practices, Industrial wastes.

Proposed amendments to section 8 of the Federal Water Pollution Control Act would subject federal grants for the planning and construction of sewage treatment facilities to the following requirements and limitations: (1) approval by the state agency and administrator; (2) provision by the applicant for proper and efficient operation and maintenance of the facility; (3) payment by the grantee of all costs not paid by other agencies; (4) conformity with the state water pollution control plan; (5) with certain exceptions, no grant shall exceed 30% of

the estimated reasonable cost; and (6) the grantee must recover a pro rata share of the cost from any industrial user of the facility. In approving grants, the administrator shall determine: (1) the project's public benefits; (2) the relationship of cost to the necessity for the facility; and (3) the applicant's ability to meet future needs of operation, maintenance, expansion and replacement to comply with water quality standards. Other provisions of the bill establish methods for allocating grants among and within the states and establishing wages for workers on the project. (Gallagher-Florida)
W71-11225

RULES AND REGULATIONS FOR SEWERAGE SYSTEMS AND WASTE TREATMENT WORKS.
Arizona State Dept. of Health, Phoenix.
For primary bibliographic entry see Field 05D.
W71-11266

LOUISIANA STATE UNIVERSITY LAW CENTER RESEARCH ACTIVITIES,
Louisiana State Univ., Baton Rouge. Law School.
For primary bibliographic entry see Field 02L.
W71-11278

PURITY AND UTILITY: DIVERSITY OF INTEREST IN RIVER POLLUTION.

Univ. of Pennsylvania Law Review, Vol 84, p 630-640, 1936, 11 p, 77 ref.

Descriptors: *Legal aspects, *Rivers, *Water pollution control, *Riparian rights, Pollution abatement, Water quality control, Judicial decisions, Water rights, Civil law, Relative rights, Competing uses, Diversion, Domestic water, Industrial water, Municipal water, Natural use, Reasonable use, Remedies, Waste disposal, Water pollution.

The role is considered of the judiciary in pollution abatement as perceived during the 1930's. Since the public as a whole is deemed apathetic to the problem of river pollution, the courts represent the greatest weapon to combat the pollution problem. The judiciary, by combining a frank avowal that the question of reasonable use in pollution cases is essentially a matter of utility and public welfare with a readiness to employ the supervisory power of equity, can probably do more to insure control of river pollution than can be expected from governing boards or federal commissions. The common law doctrine of riparian rights and its application to pollution cases is examined. The prior appropriation rule of the western states is also considered. While prior appropriation doctrine is based on different conceptions of law then is the riparian theory, the legal results in pollution cases are the same. The various judicial decisions are considered with respect to the industrial demand to pollute, public interest in protecting the water supply, and municipal sewage disposal. Also considered are the determining factors in pollution cases and the judicial use of the injunction. (Horwitz-Florida)
W71-11283

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
House Bill 5958, 92d Cong, 1st Sess (1971). 12 p.

Descriptors: *Federal government, *Water pollution control, *State governments, *Grants, Government finance, Allotments, Pollution abatement, Water pollution, Water quality, Water quality control, Treatment facilities, Sewage, Industrial wastes, Administrative agencies, Water purification, Sewage disposal, Waste treatment, Standards, Capital costs.
Identifiers: *Federal Water Pollution Control Act.

This proposed amendment to the Federal Water Pollution Control Act authorizes appropriations through fiscal year 1975 for grants to state and interstate agencies to assist them in meeting the costs of establishing and maintaining adequate measures for the prevention and control of water pollution. Allotments to the states are to be based on population, the extent of pollution and financial need. The Bill sets criteria for withholding funds from approved plans and approving the proposed pollution control plans of both interstate and state agencies. The amendment provides methods for determining the amount of each state's allotment distributable to interstate and state water pollution control agencies. There are also provisions setting the amount of and criteria for grants to states initiating improved water pollution control programs. Maximum amounts distributable from a state's allotment for specified projects are set forth. The proposed amendment authorizes grants for the development of: (1) improved methods of controlling sewage discharge, (2) advanced waste treatment and water purification methods and (3) improved methods for preventing pollution from industrial wastes. (Gallagher-Florida)
W71-11289

THE REFUSE ACT: ITS ROLE WITHIN THE SCHEME OF FEDERAL WATER QUALITY LEGISLATION.
New York Univ., Bronx. Dept of Law.
For primary bibliographic entry see Field 05G.
W71-11294

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.

House Bill 859, 92d Cong, 1st Sess (1971). 15 p.

Descriptors: *Pollution abatement, *Federal government, *Grants, *Administration, Regulation, Local governments, State governments, Government supports, Inter-agency cooperation, Legal aspects, Standards, Water resources development, Federal jurisdiction, Water quality, Water quality control, Water pollution, Water pollution treatment, Research and development, Waste water treatment, Waste water reclamation.

This bill provides that the Secretary of the Interior shall cooperate with and lend assistance to other public agencies for the purpose of conducting and promoting the coordination of research into the causes, control, and prevention of water pollution and the enhancement of water quality. The following problems are specifically mentioned for the Secretary's attention: (1) means of treating municipal sewage; (2) methods of identifying the effects of pollutants upon water quality; (3) methods for evaluating the effects of augmented streamflow; (4) analysis of bodies of water with respect to water quality, uses, and needs; (5) development of new methods of controlling discharge of inadequately treated sewage; (6) development of advanced treatment facilities; and (7) development of new methods for controlling industrial pollution. In carrying out these duties the Secretary is authorized to: collect and disseminate information on pollution control, make grants to public and private agencies, secure the assistance of experts, establish and maintain research fellowships, and provide training for individuals in water pollution control. The bill then establishes detailed provisions on funding and the use of federal grants in this area. (Horwitz-Florida)
W71-11310

REGULATIONS PERTAINING TO WASTE DISCHARGE PERMITS.
Oregon Dept. of Environmental Quality, Salem.

Oregon Administrative Rules Compilation, Oregon Dep't of Environmental Quality, Salem, Ore, ch 340, secs 45-005 thru 45-060 (1970). 5 p.

Descriptors: *Oregon, *Permits, *Waste disposal, *Water pollution control, Water pollution sources, Regulation, Legal aspects, Administrative agencies, Water law, Water policy, State governments, Inspection, Standards, Sewage disposal, Ultimate disposal, Sanitary engineering, Wastes, Environmental engineering, Waste treatment, Sewage, Sewage treatment, Adoption of practices, Supervisory control (power), state jurisdiction, Water quality control.

A discharge or disposal of wastes is defined as the placement of wastes into public waters, on land, or otherwise into the environment in a manner that does or may tend to affect the quality of public waters. A permit from the Department of Environmental Quality shall be required before certain specified activities that involve the discharge or disposal of wastes may be performed. Such activities include: (1) construction of industrial or commercial facilities resulting in new or enlarged waste disposal, (2) construction of treatment or disposal facilities, (3) discharges directly into any public waters, and (4) operations which may cause pollution of public waters. Activities excluded from the permit requirement include logging, land clearing, and numerous others. No on shall be permitted to discharge into any public waters: (1) inadequately treated sewage, (2) inadequately treated commercial or industrial wastes if it is possible to otherwise effectively treat or dispose of them, and (3) toxic wastes. Procedures governing the application, issuance, conditions, denial, modification, and suspension of a permit are herein detailed. (Johnson-Florida)
W71-11367

WATER QUALITY STANDARDS SUMMARY (NEW MEXICO).
New Mexico Water Quality Control Commission, Santa Fe; and Federal Water Pollution Control Administration, Washington, D.C.
For primary bibliographic entry see Field 05G.
W71-11421

REGULATIONS GOVERNING WATER POLLUTION CONTROL IN NEW MEXICO.
Water Quality Control Commission, Santa Fe, N.M.
For primary bibliographic entry see Field 05G.
W71-11422

CALIFORNIA'S WATER POLLUTION PROBLEM.
For primary bibliographic entry see Field 05G.
W71-11423

POLLUTION PROBLEMS IN KANSAS,
For primary bibliographic entry see Field 05G.
W71-11424

OIL AND GAS CONSERVATION.

Nevada Revised Statutes secs 522.010 thru 522.040 (1961).

Descriptors: *Nevada, *Oil wells, *Pollution abatement, *Water pollution sources, Oil, Gases, Oil industry, Oil wastes, Water pollution, Water pollution control, Water quality control, Waste disposal, Pollutants, Saline water, Waste treatment, Wells, Well regulations, Well spacing, Drilling, Administrative agencies, Legislation, Administration, Regulation, Legal aspects.

The waste of oil and gas is prohibited in the state. In order to insure the proper enforcement of this prohibition, the oil and gas conservation commission is created. The composition and procedures of the commission are set forth. The commission has the authority to require the drilling, casing and plugging of wells in such manner as to prevent the pollution of fresh water supplies by oil, gas or salt water. The commission may regulate the disposal of salt water, nonpotable water and oil field wastes. The contamination or waste of underground water may also be regulated. The commission may also: (1) require the furnishing of a reasonable bond with sufficient surety for the performance of the duty to plug each dry or abandoned well and (2)

regulate well drilling and spacing. (Smiljanich-Florida)
W71-11425

RULES AND REGULATIONS FOR STANDARDS OF WATER QUALITY FOR THE INTERSTATE WATERS OF IDAHO AND DISPOSAL THEREIN OF SEWAGE AND INDUSTRIAL WASTES.
Idaho State Board of Health, Boise.
For primary bibliographic entry see Field 05G.
W71-11426

RULES AND REGULATIONS FOR THE ESTABLISHMENT OF STANDARDS OF WATER QUALITY AND FOR WASTE WATER TREATMENT REQUIREMENTS FOR WATERS OF THE STATE OF IDAHO.
Idaho State Board of Health, Boise.
For primary bibliographic entry see Field 05G.
W71-11427

WATER QUALITY STANDARDS FOR SURFACE WATERS IN ARIZONA.
Arizona Dept. of Health, Phoenix. Water Quality Control Council.
For primary bibliographic entry see Field 05G.
W71-11428

DUE PROCESS AND POLLUTION: THE RIGHT TO A REMEDY,
For primary bibliographic entry see Field 05G.
W71-11429

OCEAN DUMPING: THE OCEANS CRY FOR HELP,
For primary bibliographic entry see Field 05G.
W71-11430

HEARINGS BEFORE THE SUBCOMMITTEE ON AIR AND WATER POLLUTION OF THE COMMITTEE ON PUBLIC WORKS, UNITED STATES SENATE.
For primary bibliographic entry see Field 05G.
W71-11431

SOCIAL ASPECTS OF ENVIRONMENTAL POLLUTION,
Oregon State Univ., Corvallis. Air Resources Center.
Robert M. Alexander.
Oregon Water Resources Research Institute, Corvallis, March 1971. 49 p, 31 ref. OWRR Project A-999-ORE (8).

Descriptors: *Social aspects, *Resource allocation, *Pollution abatement, *Industrial wastes, Environmental sanitation, Cost-benefit analysis, Marketing, Economics, Feasibility studies, Diseconomies of scale, Social values, Social change, Social needs, Pollutants, Water pollution, Air pollution, Pesticide toxicity, Radiation, Radioactivity effects, Waste disposal, Pollution abatement, Judicial decisions, Administrative agencies, Regulation, Permits.

The social aspects of environmental pollution resulting from scientific and technological changes in industry are examined. Specific side effects studied include air and water pollution, pesticide toxicity, and ionizing radiation. These are considered from several economic and political viewpoints. Social goals are broken down to determine the degree of pollution abatement possible in view of the costs involved. The extent to which society is willing to bear the cost of controlling industrial pollution, and who will bear these expenditures is analyzed. The article examines the market mechanism, side effects, and external costs, concentrating upon the market mechanism and its role in allocating resources. Alternatives are suggested for dealing with the side effects of pollution: (1) the establishment and protection of rights by private negotiation, (2) adversary proceedings, measures to strengthen judicial proceedings, and courts as a political force in fostering environmental quality; (3) regulation by licensing and permit issuance; and (4) incentive programs based upon payments or charges. The article concludes with a reassessment of key social issues in relation to a reordering of priorities so as to favor environmental quality. (Rees-Florida)
W71-11432

SOME ENVIRONMENTAL IMPLICATIONS OF NATIONAL FUELS POLICIES.
Committee on Public Works (U. S. Senate).
For primary bibliographic entry see Field 05C.
W71-11433

THERMAL POLLUTION: THE 'DISHONORABLE DISCHARGE'--NEW YORK'S CRITERIA GOVERNING HEATED LIQUIDS,
For primary bibliographic entry see Field 05C.
W71-11434

THE EVOLUTION OF THE ENFORCEMENT PROVISIONS OF THE FEDERAL WATER POLLUTION CONTROL ACT: A STUDY OF THE DIFFICULTY IN DEVELOPING EFFECTIVE LEGISLATION,
For primary bibliographic entry see Field 05G.
W71-11435

QUI TAM ACTIONS AND THE 1899 REFUSE ACT: CITIZEN LAWSUITS AGAINST POLLUTERS OF THE NATION'S WATERWAYS.
For primary bibliographic entry see Field 05G.
W71-11436

MARITIME LIABILITY FOR OIL POLLUTION--DOMESTIC AND INTERNATIONAL LAW,
For primary bibliographic entry see Field 05G.
W71-11437

WATER QUALITY STANDARDS IN PRIVATE NUISANCE ACTIONS.
For primary bibliographic entry see Field 05G.
W71-11438

PENNSYLVANIA'S PUBLIC INSTITUTIONAL ARRANGEMENTS FOR THE DEVELOPMENT AND CONSERVATION OF WATER RESOURCES.
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Engineering.

Jan 1971. 59 p.

Descriptors: *Pennsylvania, *Administrative agencies, *Water resources development, *Water conservation, Administration, Regulation, Water resources, Legal aspects, State governments, Local governments, Cities, Interstate commissions, Interstate compacts, Water pollution, Water pollution control, Water quality, Water quality control.

A description of the state agencies involved with the development and conservation of the water and associated resources of Pennsylvania is presented in this publication. The following types of state agencies are dealt with: (1) administrative agencies; (2) departmental administrative boards and commissions; (3) advisory agencies; (4) departmental advisory groups; (5) executive departments; and (6) special purpose districts, regions, and field divisions. These various boards, commissions, and departments are not functionally exclusive. The various agencies are described in relation to their role in the regulation and development of water resources in terms of their powers and duties. The following political subdivisions are examined in their relationship to the conservation of water resources: (1) counties, (2) big cities, (3) cities of the third class, (4) boroughs, (5) townships, and (6) municipal authorities. Interstate and federal-state mechanisms for coordination are also discussed. (Robinson-Florida)
W71-11439

THE NATIONAL ENVIRONMENTAL SCIENCE TRIANGLE,
Senate, Washington, D.C.
For primary bibliographic entry see Field 05G.
W71-11440

AN OVERVIEW AND FORECAST OF FEDERAL REGULATION OF VESSEL DISCHARGES AND SPILLS,
Patton, Blow, Verill, Brand and Boggs.
For primary bibliographic entry see Field 05G.
W71-11441

A REVIEW AND PROJECTION OF STATE REGULATIONS OF VESSEL DISCHARGES AND SPILLS,
National Association of Engine and Boat Manufacturers.
For primary bibliographic entry see Field 05G.
W71-11442

REFUSE ACT OF 1899 PERMIT PROGRAM,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 05G.
W71-11444

PRESENT AND FUTURE INTERNATIONAL AGREEMENTS FOR POLLUTION ABATEMENT AND THEIR IMPACT ON NEW SHIP CONSTRUCTION,
Maritime Administration, Washington, D.C. Office of Ship Construction.
For primary bibliographic entry see Field 05G.
W71-11447

THE COAST GUARD'S RESEARCH AND DEVELOPMENT PROGRAM IN MARINE POLLUTION PREVENTION AND CONTROL SYSTEMS,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 05G.
W71-11451

THE ROLE AND MISSION OF THE EPA REGIONAL OFFICE,
Environmental Protection Agency, Wash., D.C.
For primary bibliographic entry see Field 05G.
W71-11455

THE NATIONAL MARINE FISHERIES SERVICE AND ITS ROLE IN THE PREVENTION AND CONTROL OF POLLUTION,
National Oceanic and Atmospheric Administration, Silver Spring, Md.
For primary bibliographic entry see Field 05G.
W71-11457

COASTAL STATES ORGANIZATION'S PROGRAM TO DEVELOP REGIONAL POLLUTION PREVENTION/CONTROL STANDARDS AND ACTIVITIES,
Coastal States Organization.
For primary bibliographic entry see Field 05G.
W71-11459

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.

House Bill 858, 92d Cong, 1st Sess (1971). 25 p.

Descriptors: *Federal government, *Water pollution control, *Standards, *Federal jurisdiction, Legal aspects, Regulation, Pollution abatement,

Water pollution treatment, Water pollution, Water policy, Administration, Water conservation, Public rights, Waste water treatment, Water quality, State governments, State jurisdiction, Inspection, Administrative agencies, Administrative decisions, Non-structural alternatives, Legislation.
Identifiers: *Federal Water Pollution Control Act.

The purpose of this Bill is to: (1) enhance the quality of our environment; (2) establish a national policy for the prevention, control, and abatement of water pollution; and (3) plan future national water quality management for the nation's population growth, industrial expansion, agricultural intensification, energy requirements, recreation and conservation uses, and environmental quality. The federal government, through the Secretary of the Interior, will assume the responsibility and right to prevent and control water pollution where necessary to complement state programs, and to protect the right of the public to clean water. To achieve this end, the Secretary shall prepare and develop comprehensive programs for eliminating or reducing water pollution. State governments must comply with provisions of this Bill in setting pollution control standards or give way to the Secretary in this area. Administrative procedures and guidelines for developing pollution control standards are enumerated. Detailed provisions for the enforcement of such standards by the Secretary and the Attorney General are set forth. Penalties for violations are established and include fines, imprisonment, and injunctive relief. (Horwitz-Florida)
W71-11462

ON THE LEGAL ASPECTS AND PROBLEMS OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11481

WATERS AND WATERCOURSES--POLLUTION AS A PERMANENT INJURY--PROXIMATE CAUSE (OKLAHOMA 1930).

Rocky Mountain Law Review, Vol 3, p 82-84, 1931, 3 p.

Descriptors: *Oklahoma, *Riparian lands, *Impaired water quality, *Remedies, Judicial decisions, Legal aspects, Damages, Water pollution, Riparian waters, Riparian rights, Waste disposal, Oil wastes, Water utilization, Water pollution effects, Reasonable use.

All courts do not agree in determining what is a permanent injury caused by water pollution. One approach is to define permanent injury as one of a character which will not diminish in extent and will continue indefinitely. An injury that lasts for a time only, even though it be for several years, cannot be deemed permanent. Permanency carries with it the idea of something that is durable, lasting, and never changes. A minor modification of this approach suggests that the word 'permanent' in its legal sense does not necessarily mean forever, yet the word conveys the idea of an indefinite continuance in the same state. Another approach holds that the word 'permanent' is not equivalent to perpetual or unending or unchangeable, but includes the idea of practical irremediability. Thus the character of the injury rather than the continuance of the act is the primary determinant. Another approach holds that an injured landowner may suffer a loss without having a right of action if the polluting operation is conducted in the ordinary and usual mode. Although some courts allow an action, due care is a defense. (Shelnut-Florida)
W71-11484

MARINE PROTECTION ACT OF 1971 (A BILL TO REGULATE THE DUMPING OF MATERIAL IN THE OCEANS, COASTAL, AND OTHER WATERS AND FOR OTHER PURPOSES).
House Bill 4723, 92d Cong, 1st Sess (1971). 14 p.

Descriptors: *United States, *Water pollution control, *Oceans, *Waste disposal, Water quality control, Water pollution, Sea water, Aquatic environment, Federal government, Administrative agencies, Legislation, Legal aspects, Permits, Standards, Regulation, Administration, Garbage dumps, Federal jurisdiction.

In accordance with the established policy of the United States, the purpose of the proposed Marine Protection Act is to regulate the transportation of materials from the United States for dumping into the oceans and coastal waters and dumping from any source into waters over which the United States has jurisdiction. Unless such transportation or dumping is authorized by permit, no person shall transport material from the United States for the purpose of dumping, and no person shall dump material in waters which are within or contiguous to the territorial sea of the United States. The Administrator of the Environmental Protection Agency may issue permits for transportation and dumping where the proposed activity will not unreasonably degrade or endanger human health or the marine environment. He shall establish and apply criteria for reviewing and evaluating permit applications. No permit will be issued for dumping violative of applicable water quality standards. Additional provisions for the issuance of permits are enumerated. Violators are liable for civil penalties, while willfull violators are subject to criminal fines. The Act's relationship to other legislation is described. The Administrator is authorized to issue necessary regulations. (Shelnut-Florida)
W71-11488

CONSTRUCTION AND USE OF WASTE DISPOSAL WELLS.
Oregon Dept. of Environmental Quality, Salem.
For primary bibliographic entry see Field 05E.
W71-11500

RIPARIAN RIGHTS AND THE 'NECESSARY INDUSTRY DOCTRINE,' STREAM POLLUTION--INJUNCTION AGAINST--DAMAGES FOR,
Robert Sinon, Bernard Grainey, and James McVay.
Notre Dame Lawyer, Vol 18, p 69-83, 1943. 15 p, 57 ref.

Descriptors: *Industrial wastes, *Water pollution sources, *Pollution abatement, *Remedies, Water pollution, Water pollution control, Montana, Illinois, Pennsylvania, Prior appropriation, Industrial water, Water quality, Water quality control, Riparian rights, Legal aspects, Reasonable use, Judicial decisions, Relative rights, Adjudication procedure.
Identifiers: Injunction (Prohibitory).

Analyzed in this article is the necessary industry doctrine, which suspends or bars injunctive relief against industrial polluters of streams on the theory that damage to the industry would be greater than the damage to the riparian. A description of the judicial approach regarding this doctrine in Illinois, Pennsylvania and Montana is the basic thrust of the article. After analyzing several cases, the author concludes that Illinois places a necessary industry in the same position as any other riparian owner and does not weigh the equities in granting injunctive relief. Pennsylvania, on the other hand, applies a modified version of the necessary industry rule so that no liability arises for stream pollution when the industrial riparian is carefully operating a necessary industry in the only known, practicable manner. In discussing the Montana approach, the doctrine of prior appropriation must be considered. If the industry is a prior appropriator and the business is conducted in the ordinary manner for such industries, injunctive relief will be denied. If the industry is not a prior appropriator, injunctive relief will be granted under the common law rules. (Gallagher-Florida)
W71-11501

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.

House Bill 5966, 92d Cong, 1st Sess (1971). 29 p.

Descriptors: *Water quality, *Standards, *Water pollution control, *Pollution abatement, Water pollution, Water quality control, Regulation, Pollutants, Water pollution sources, Water pollution effects, Administrative agencies, Administration, Water pollution treatment, Treatment facilities, Environmental effects, State governments, Federal government, Remedies, Effluents, Discharge (Water), Supervisory control (Power), Legislation, Legal aspects.

Under this proposed legislation the Federal Water Pollution Control Act would be amended to provide for water quality standards and enforcement. The Administrator of the Environmental Protection Agency would be required to promulgate regulations relating to: (1) various environmental considerations for water use designations, (2) specifications for water quality criteria, and (3) minimum acceptable levels of treatment or control. States would be given a certain amount of time to promulgate water quality standards consistent with these regulations and acceptable to the Administrator. If no acceptable state water quality standards are enacted, the Administrator would, pursuant to certain procedures, enact water quality standards for such state. If the Administrator determines that violations of such standards are occurring, he shall notify the violators and the water pollution control agency of the affected state of his determination and of the remedial action required to achieve compliance. If the violation does not cease, penalties and procedures for enforcement of the standards are provided, along with procedures for hearings, investigations, and civil actions. Within a certain time period the Administrator would publish a list of highly dangerous pollutants and propose effluent limitations on such pollutants. (Smiljanich-Florida)
W71-11503

ORGANIZATIONAL FRAMEWORK OF STATE AND REGIONAL WATER POLLUTION CONTROL BOARDS.
California Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W71-11510

CLEAN LAKES ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, AND FOR OTHER PURPOSES).

House Bill 6486, 92d Cong, 1st Sess (1971). 9 p.

Descriptors: *Lakes, *Pollution abatement, *Treatment facilities, Government finance, Ecology, Fresh water, Navigable waters, Eutrophication, Economic impact, Environmental effects, Water pollution effects, Social aspects, Water pollution, Water pollution control, Standards, Water quality, Water quality control, Grants, Operation and maintenance, Waste water disposal, Waste water treatment, Legal aspects, Legislation, Financing.

To emphasize the need for this amendment to the Federal Water Pollution Control Act, the adverse social, economic, and ecological effects of lake pollution are specified in the initial sections of the proposed bill. The purpose of the proposed bill is to provide a comprehensive and coordinated action program, using the latest technology and available resources, to enhance the quality of public fresh water navigable lakes in urban and rural areas of the United States, with particular attention given to small community lakes. To achieve this purpose, the bill authorizes the Administrator of the Environmental Protection Agency to increase the federal share of construction costs to 65% for treatment works located in areas near fresh water navigable lakes. In addition to the requirements for

normal grants, these increased grants are subject to other conditions of operation and maintenance. The bill authorizes additional appropriations to meet this increase and sets the maximum amounts allowable to any one state or interstate agency. The criteria for approving grant applications under the proposed amendment are specified. Penalties are established for discharging water into lakes covered by the bill in violation of water quality standards. (Gallagher-Florida)
W71-11511

DETERGENT POLLUTION CONTROL ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO ESTABLISH STANDARDS AND PROGRAMS TO ABATE AND CONTROL WATER POLLUTION BY SYNTHETIC DETERGENTS).
House Bill 7725, 92d Cong, 1st Sess (1971). 14 p.

Descriptors: *Water pollution control, *Eutrophication, *Detergents, *Phosphates, Legislation, Water law, Federal government, Water pollution, Standards, Water pollution effects, Alkylbenzene sulfonates, Water pollution sources, Aquatic algae, Public health, Biodegradation, Toxicity, Contracts, Grants, Research and development, Inspection, Federal jurisdiction.

Surface and groundwaters in the United States are being seriously polluted and degraded by the discharge into such waters of synthetic detergents. In order to abate such pollution the Federal Water Pollution Control Act would be amended by the Detergent Pollution Control Act of 1971. The federal government would provide assistance in the development of pollution-free detergents. The Environmental Protection Agency would establish standards of water eutrophication ability, biodegradability, toxicity, and of effects on the public health and welfare which would have to be met by all detergents. Procedures for establishing such standards are herein set forth. Such standards would have to be met by June 30, 1973. Detergents not in compliance would be proceeded against and condemned. Further enforcement provisions and judicial procedures are set forth. Provision is also made for the inspection of manufacturing facilities, and the sampling of both domestic and imported detergents. (Robinson-Florida)
W71-11516

STREAM POLLUTION AND SPECIAL INTERESTS,
For primary bibliographic entry see Field 05B.
W71-11520

ENFORCEMENT (WATER QUALITY REQUIREMENTS).
California Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W71-11522

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT TO PROVIDE ADDITIONAL PROTECTION TO MARINE AND WILDLIFE ECOLOGY BY PROVIDING FOR THE ORDERLY REGULATION OF DUMPING IN THE OCEAN, COASTAL, AND OTHER WATERS OF THE UNITED STATES.

House Bill 7619, 92d Cong, 1st Sess (1971). 5 p.

Descriptors: *Waste disposal, *Water pollution control, *Permits, *Administrative agencies, Water pollution, Ecology, Environment, Environmental effects, Wildlife, Wildlife conservation, Oceans, Wildlife habitats, Estuaries, Legal aspects, Remedies, Water quality, Water quality control, Federal government, Legislation.

Under the provisions of this proposed legislation, intended to protect marine and wildlife ecology, the Administrator of the Environmental Protection Agency, the Secretary of the Interior, and the Secretary of the Army would establish standards for waste discharges which might harm the ecology of ocean, coastal, and other waters. Such standards shall require the presentation of sufficient evidence to prove no ecological danger from the proposed materials at the proposed site. The standards would be enforced by both the federal and state governments, and both federal and state governments would be subject to them. Any state standard established must meet the minimum federal standards. All persons or agencies applying for a discharge permit must furnish reports as required by the Administrator. Jurisdiction to restrain violations of the legislation is in the federal district courts. A civil penalty ranging from $5,000 to $10,000 is imposed for violations. Upon enactment, all prior permits for such discharges will be terminated. (Hart-Florida)
W71-11533

WATER QUALITY CONTROL PLANS.
California Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W71-11542

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.

House Bill 907, 92d Cong, 1st Sess (1971). 15 p.

Descriptors: *Federal government, *Grants, *Administration, *Pollution abatement, Federal jurisdiction, State governments, State jurisdiction, Regulation, Standards, Research and development, Water pollution control, Water quality, Administrative agencies, Government finance, Inspection, Legal aspects, Water policy, Research facilities, Waste treatment.

Under this proposed legislation the Administrator of the Environmental Protection Agency shall conduct, in the Agency and with other appropriate public authorities and private institutions and individuals, the coordination of research and studies into the causes, control, and prevention of water pollution and the enhancement of waste water reuse technology. In carrying out these duties the Administrator is authorized to: (1) collect and disseminate information and recommendations through all appropriate means; (2) make grants and enter into contracts with public or private agencies, institutions and individuals; (3) secure the assistance of experts, scholars, and consultants; (4) establish and maintain research fellowships in the Agency; and (5) provide training for individuals and support training projects relating to the causes, prevention, and control of water pollution. The Administrator is also directed to establish and maintain field laboratories and research facilities for the conduct of research relating to the causes, control, and prevention of water pollution. Funds are made available to the Administrator from which he shall make allotments to the several states, in accordance with specified regulations, on the basis of population, extent of water pollution, and financial need. (Horwitz-Florida)
W71-11547

POWER OF LEGISLATURE TO AUTHORIZE POLLUTION OF FISHERIES.
Harvard Law Review, Vol 46, p 165-166, 1933. 2 p.

Descriptors: *Virginia, *Fisheries, *Tidal waters, *Sewage disposal, State governments, Legislation, Legal aspects, Water pollution, Navigation, Judicial decisions, Regulation, Federal government.

In Virginia, the legislature has the power to authorize actions which render the state's tidal water unfit for fishing. Except on grounds of policy, it appears that state waters, like public lands, are the state's to do with as it sees fit as long as interstate or foreign commerce is not molested. A contrary prevailing doctrine is that, apart from limitations of the Federal Constitution, a state may not alienate areas under tidal waters when the public interest in navigation might thereby be endangered. The usual assertion is that the state holds title as trustee for the benefit of the people. In England, the public right of navigation could not be destroyed by alienation. A desire to annual unwise grants of uniquely valuable portions of the public domain led some American courts to extend the English doctrine. Although most cases can be rested on protection of navigation, a corresponding public right in fishing is sometimes mentioned. (Shelnut-Florida)
W71-11548

A BILL TO PROHIBIT DISCHARGE OF ANY MILITARY MATERIAL OR OTHER REFUSE INTO NAVIGABLE WATERS OF THE UNITED STATES OR INTO INTERNATIONAL WATERS, AND FOR OTHER PURPOSES.
House Bill 6884, 92d Cong, 1st Sess (1971). 3 p.

Descriptors: *Military aspects, *Waste disposal, *Federal government, *Hazards, Chemical wastes, Radioactive wastes, Radioactive waste disposal, Administrative agencies, Ultimate disposal, Environment, Legislation, Navigable waters, United States.

The discharge into navigable waters of the United States or international waters of any munitions; any chemical, biological, or radiological warfare agents; any other military material; or any other refuse, is prohibited by this proposed legislation unless in accordance with a certificate issued by the Environmental Protection Agency. The Secretary of Defense shall inventory existing munitions; chemical, biological and radiological agents; and other material which might endanger man or the environment through disposal. He shall also determine the ultimate safe retention date and the best disposal method. This data shall be submitted to the Environmental Protection Agency. Before the acquisition of other materials which may endanger man or the environment upon disposal, the Secretary of Defense shall submit identical data on the items proposed for acquisition to the Environmental Protection Agency and to Congress. (Hart-Florida)
W71-11550

CERTIFICATION OF FACILITIES FOR TAX AMORTIZATION PURPOSES.
For primary bibliographic entry see Field 05D.
W71-11558

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, TO PROVIDE FINANCIAL ASSISTANCE FOR RIVER BASIN PROGRAMS.
House Bill 1720, 92nd Cong, 1st Sess (1971). 4 p.

Descriptors: *Federal government, *Grants, *Water quality control, *Water districts, Groundwater basins, State governments, Local governments, Financing, Pollution abatement, Standards, Research and development, Treatment facilities, Waste treatment, Watersheds (Basins), River basins, Administration, Operation and maintenance, Water pollution control, Government finance, Legal aspects, Administrative agencies.
Identifiers: *Water Pollution Control Act.

The Secretary of the Interior would be authorized by this Bill to make grants to intrastate basin water quality management agencies having water quality jurisdiction. Such grants may not exceed 50 percentum of the administrative, investigatory, operator training, and inspection costs of a water quality management plan capable of being implemented. Intrastate agency plans must be consistent with applicable water quality standards and have been approved by the appropriate state agencies consistent with state statutes. The Secretary must also determine that the intrastate agency is capable of ex-

ecuting such plans. A basin water quality management plan shall provide for comprehensive water quality management for a basin, such as control of waste sources, construction, operation, and maintenance of waste treatment facilities, control of flow, diversion, or impounding of basin water, and techniques for financing and distributing the cost of waste treatment facility construction and operation, as well as other measures necessary for effective basin water quality management. The Secretary must approve plans under guidelines set out in the Bill before authorizing the grant. Such grants shall be computed separately from those authorized for state and interstate agencies. (Horwitz-Florida)
W71-11584

WASTE DISCHARGE PERMIT AND REPORTING REQUIREMENTS.
Montana State Board of Health, Helena.
For primary bibliographic entry see Field 05D.
W71-11585

WATERS AND WATERCOURSES--PERCOLATING WATERS--POLLUTION.

Michigan Law Review, Vol 33, p 462-464, 1935. 3 p, 12 ref.

Descriptors: *Water pollution sources, *Oil industry, *Percolating water, *Economic justification, Judicial decisions, Legal aspects, Water pollution, Water pollution control, Subsurface waters, Public rights, Industrial wastes, Riparian rights, Social aspects, Industrial production, Pollution abatement, Exploitation, Oily water, Reasonable use.

In the case discussed in this comment defendant's oil refinery operations contaminated the percolating waters beneath the land. This water formed a part of the supply for plaintiff's water well on the adjoining land. In commenting on the court's verdict for defendant, the author concludes that the court adopted the minority rule as to the pollution of percolating waters, which extends the principle that the landowner has an unlimited right to use percolating waters and holds that what one may take as a matter of right can be rendered unavailable by pollution. The importance of the case, according to the author, is the court's adoption of a public policy favoring industrial exploitation of a sector geographically suited to commercial development. The author discusses other English and American nuisance cases where this aspect of public policy has been used in deciding the reasonableness of the defendant's use. The author notes that in these cases the use of public policy to deny relief was limited to nonmaterial injuries. The author concludes that public policy was misused in the instant case since the injury resulted in a taking of property without just compensation. (Gallagher-Florida)
W71-11594

THE LEGAL AND ECONOMIC ASPECTS OF POLLUTION,
Chicago Univ., Ill. Center for Policy Study.
For primary bibliographic entry see Field 05G.
W71-11608

LAWS AND REGULATIONS RELATING TO WATER POLLUTION CONTROL AFFECTING THE DISTRICT OF COLUMBIA,
District of Columbia Dept. of Public Health, Washington, D.C. Gov't of the District of Columbia, Washington, D.C., Dept. of Public Health.
For primary bibliographic entry see Field 05G.
W71-11615

INTERNATIONAL CONTROL OF MARINE POLLUTION,
For primary bibliographic entry see Field 05G.
W71-11616

STATEWIDE STANDARDS AND CRITERIA FOR MANAGEMENT OF SHORELAND AREAS OF MINNESOTA.
For primary bibliographic entry see Field 05G.
W71-11617

LEGAL ASPECTS OF A FEDERAL WATER QUALITY SURVEILLANCE SYSTEM,
For primary bibliographic entry see Field 05G.
W71-11618

ENVIRONMENTAL FINANCING ACT OF 1970 (A BILL TO ESTABLISH AN ENVIRONMENTAL FINANCING AUTHORITY TO ASSIST IN THE FINANCING OF WASTE TREATMENT FACILITIES, AND FOR OTHER PURPOSES.

House Bill 338, 92d Cong, 1st Sess (1971). 11 p.

Descriptors: *Government finance, *Administrative agencies, *Waste treatment, *Treatment facilities, Interest, Water pollution treatment, Financing, Federal government, State governments, Local governments, Loans, Water pollution, Water pollution control, Water quality, Water quality control.

An Environmental Financing Authority would be created by this proposed legislation to assure the availability of funds, at reasonable rates, for local and state governments to construct waste treatment works. The Authority would be a corporate body supervised by the Treasury Department. One director is appointed by the Secretary of the Treasury and the remaining four by the President. The Authority may purchase obligations of a local government issued to finance waste treatment projects when it is certified that funds are not otherwise available at reasonable rates. The Secretary of the Treasury is authorized to advance initial capital. The Authority may itself issue obligations which may be purchased by the Treasury Department. The Authority's annual loss will be reimbursed by the Treasury Department. The Authority and its property will be tax exempt. Realty and obligations of the Authority, however, are subject to taxation. Obligations of the Authority are lawful investments for funds of the United States and eligible for purchase by national banks. An annual report will be given to the President and Congress. The Authority is subject to the Government Corporation Control Act. (Hart-Florida)
W71-11619

CLEAN WATER FINANCING ACT OF 1971 (A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED, TO PROVIDE FINANCIAL ASSISTANCE FOR THE CONSTRUCTION OF WASTE TREATMENT FACILITIES, AND FOR OTHER PURPOSES.
House Bill 860, 92d Cong, 1st Sess (1971). 5 p

Descriptors: *Financing, *Government finance, *Water pollution control, *Waste treatment, Pollution abatement, Water quality, Water quality control, Administrative agencies, Federal government, State governments, Treatment facilities, Capital costs, Capital supply.
Identifiers: Water Pollution Control Act.

The proposed Clean Water Financing Act of 1971 would amend the Federal Water Pollution Control Act to provide financial assistance for the construction of waste treatment facilities and for other purposes. The Secretary is authorized to incur grant agreements totalling $4 billion, of which $1 billion shall be available for four consecutive years beginning June 30, 1971. Sixty per cent of the funds will be appropriated in the ratio that each state's population bears to the population of all states, except that the first $100 million will be allocated as follows: (1) 50% according to the population ratio and 50% according to the ratio of per capita income; (2) 20% to states agreeing to pay 25% of the cost; (3) 20% to states with the most serious pollution abatement problems and to those states which can use funds to satisfy basin-wide pollution abatement plans; and (4) the total allocation under 1, 2 and 3 shall not exceed the amount obligated during the preceding fiscal year. Population shall be determined according to the last year for which satisfactory population figures are available. (Hart-Florida)
W71-11620

A BILL TO AMEND THE PUBLIC HEALTH SERVICE ACT TO PROHIBIT THE DISCHARGE OF ELEMENTAL MERCURY AND ITS COMPOUNDS INTO THE NAVIGALBE WATERS OF THE UNITED STATES.

House Bill 1094, 92d Cong, 1st Sess (1971). 3 p.

Descriptors: *Chemical wastes, *Waste disposal, *Heavy metals, *Navigable waters, United States, Administrative agencies, Administrative decisions, Recreation, Potable water, Foods, Water pollution, Water pollution sources, Water pollution control, Water quality, Water quality control, Legislation.

Discharge of elemental mercury and its compounds into navigable waters of the United States would be prohibited by this proposed legislation. The Secretary of Health, Education and Welfare is to be designated as prohibited areas those navigable waters used for drinking, recreation, other activities in which direct contact is made with the water, and which supply food for human consumption. A fine of $10,000 is levied for each violation. Jurisdiction to restrain violations would be in the Federal district courts. District courts shall furthermore be empowered to subpeona persons for testimony and require production of documents; the contempt power may be used to enforce this authority. 'Navigable waters of the United States' means all portions of the seas within the jurisdiction of the United States and all inland waters navigable in fact and in law. (Hart-Florida)
W71-11621

A BILL TO PROVIDE FOR CONSTRUCTION OF CONTAINED DREDGED SPOIL DISPOSAL FACILITIES FOR THE GREAT LAKES AND CONNECTING CHANNELS, AND FOR OTHER PURPOSES.
House Bill 931, 92d Cong, 1st Sess (1971). 4 p.

Descriptors: *Federal government, *Pollution abatement, *Dredging, *Waste disposal, Federal jurisdiction, Administration, Administrative agencies, Regulation, Legal aspects, Standards, Control, Great Lakes, Water pollution control, Water pollution sources, Supervisory control (Power), Treatment facilities, Facilities, Government finance, Loans, Financing, Operation and maintenance.

Open water disposal of dredged spoil from authorized federal navigation projects and all other sources in any of the Great Lakes and their connecting channels shall be discontinued, where such spoil has been dredged from an area which the Secretary of the Interior has determined, after consultation with the governors concerned, to be significantly polluted. Such disposal shall be discontinued as soon as the Secretary of the Army determines that dredged spoil disposal sites are available. The Secretary of the Army is authorized to construct, operate, and maintain contained spoil disposal facilities of sufficient capacity to meet the requirements of this bill for a period not to exceed ten years. Prior to construction of any such facility, the appropriate non-federal interests shall agree in writing to: (1) furnish all lands, easements, and rights-of-way necessary for the construction, operation, and maintenance of the facility; (2) contribute 50 per centum of the construction costs to the United States; (3) hold the United States free from damages due to construction, operation, and maintenance; and (4) maintain the facility for disposal purposes in a manner satisfactory to the Secretary of the Army. (Horwitz-Florida)
W71-11622

A BILL TO AMEND THE FEDERAL WATER POLLUTION CONTROL ACT TO INCREASE THE PENALTY FOR POLLUTION OF THE WATER BY OIL.
House Bill 2522, 92d Cong, 1st Sess (1971). 4 p.

Descriptors: *Federal government, *Legislation, *Oil wastes, *Oil, Legal aspects, Federal jurisdiction, Regulation, Administration, Administrative agencies, Pollution abatement, Ships, Water pollution sources, Oily water, Supervisory control (Power), Water policy, Oceans, Water quality, Water quality control, Water pollution control.

Various subsections of the Water Pollution Control Act would be amended by this bill to increase the Act's coverage and provide for stronger penalties. The words willful or negligent are added to section 11 and the fine imposed by paragraph 4 of subsection b of section 11 is increased from $10,000 to $100,000. The Secretary of the Department in which the Coast Guard is operating shall appoint an Oil Pollution Hearing Board consisting of five members to investigate any violations of this bill. The Board shall submit a report of its findings to the Secretary, which shall include: (1) evidence of whether or not the violatation occurred, (2) the identity of the violators, and (3) the approximate number of gallons of oil discharged. The Secretary shall assess against any owner or operator found by the Board to have committed a violation, a civil penalty in the amount of $10 per gallon of oil discharged. The Secretary of the Treasury shall withhold clearance for all vessels owned or operated by a person subject to this penalty unless a bond or other satisfactory surety is obtained. Penalties for violators based on vessel weight are likewise increased. (Horwitz-Florida)
W71-11623

POLLUTION,
For primary bibliographic entry see Field 05G.
W71-11624

WATERS AND WATERCOURSES--POLLUTION--ACCRUAL OF CAUSE OF ACTION.
For primary bibliographic entry see Field 05G.
W71-11625

JOINT LIABILITY OF INDEPENDENT WRONGDOERS FOR POLLUTION OF WATER COURSE.
For primary bibliographic entry see Field 05G.
W71-11626

ANIMALS FERAE NATURAE--COMMONWEALTH NOT PERMITTED TO RECOVER DAMAGES IN TRESPASS FOR NEGLIGENT KILLING OF FISH BY POLLUTION,
For primary bibliographic entry see Field 05C.
W71-11627

WATER POLLUTION CONTROL IN MISSISSIPPI,
For primary bibliographic entry see Field 05G.
W71-11628

MERCURY CONTROL ACT OF 1971 (A BILL TO PROVIDE FOR CONTROL OF THE USE OF THE ELEMENT MERCURY OR ITS COMPOUNDS, AND FOR OTHER PURPOSES).
House Bill 1727, 92d Cong, 1st Sess (1971). 2 p.

Descriptors: *Federal government, *Legislation, *Pollution abatement, *Chemical wastes, Federal jurisdiction, Regulation, Standards, Administration, Metals, Inorganic compounds, Public health, Water pollution control, Water pollution sources, Water quality, Water quality control, Supervisory control (Power), Legal aspects, Water policy, Inspection, Industrial wastes.
Identifiers: *Mercury.

The Congress finds that the metal mercury is highly toxic and that random disposal of mercury and its compounds is highly dangerous to the balance of nature, the purity of the air, and the health and common welfare of the people of the United States. All persons who use more than 100 pounds per year of mercury or its compounds in industrial or manufacturing processes would be required by this bill to register annually with the Administrator of the Environmental Protection Agency, submitting an account of all mercury and its compounds obtained, retained in manufacturing usage, sold, or lost by ventilation, water wastes, solid disposal, or product contamination. The Administrator shall provide for periodic inspection of all mercury users required to register and shall prescribe such regulations as may be necessary to carry out this bill. Violators of this registration requirement may be fined not more than $500 per day for each day of violation. When the Administrator determines that any person has violated any provision of this bill or regulation, he shall seek injunctive or other appropriate relief in the appropriate federal court. (Horwitz-Florida)
W71-11629

PRIORITIES FOR DEVELOPING LEGAL AND ECONOMIC RESEARCH ON WATER PROBLEMS,
Jan Van Schilfgaarde.
In: Implementation of Regional Research in Water-Related Problems, Law School, University of Wisconsin, Madison, Wisconsin. p 1-27, 1970, 27 p, 57 ref.

Descriptors: *Water resources development, *Water pollution control, *Social aspects, *Economics, Water pollution, Water pollution sources, Pollution abatement, Adoption of practices, Decision making, social function, Evaluation, Economic efficiency, Research and Development, Data collections, Coordination, Administration, Legal aspects.

In order to explore and identify approaches to implementing economic and legal research on regional water-related problems, the author identifies the problem areas in water resources that lend themselves to research by social scientists and discusses means to implement such studies. The effective development of water resources is of great importance to our well-being. Progress in water management development, operations, and research requires a thorough understanding of the physical, biological, and economic facts involved. In terms of pollution abatement, such understanding can only be achieved by a more effective and frequent association of specialist at the working level in the respective disciplines. An example of interdisciplinary research deals with sedimentation. Sediment is thought to be the nation's major polluter. Considerable research effort is being expended to study sediment movement and its control. A major function for economists is to help arrive at a rationale as to what approaches, either in research or in practice, are most likely to result in an acceptable answer to the problem. Methods for the implementation of meaningful research are discussed. Organizational structure is not as important as funding or personnel. (Smiljanich-Florida)
W71-11630

POLLUTION--PLEADING UNDER THE CODE.
Indiana Law Journal, Vol 3, 403-484, 1928, 2 p.

Descriptors: *Indiana, *Riparian rights, *Reasonable use, *Adjudication procedure, Sewage disposal, Relative rights, Remedies, Riparian land, Judicial decisions, Legal aspects, Water pollution, Waste disposal, Damages, Water utilization, Rivers, Waste water.

The right of a riparian owner to have a stream flow by his land in its natural condition extends to both the quality and quantity of the water, and an upper owner has no right to use his land or the water passing thereby so as to cause pollution. However, the right of a lower owner is subject to the upper owner's right to make reasonable use of the water, and whether a use which affects the purity of the water is reasonable is a question of fact. Under code pleading, when defendant has entered a general denial, it is proper to exclude his evidence supporting a contention that he exercised the right of reasonable use with due care. This would be a confession and avoidance rather than a general denial. If pleaded correctly, the upper owner might make a valid answer. If he could show the use was reasonable. If the use was unreasonable, diligence and due care would be no defense. The only exception to this rule of pleading is in the case of ejectment. (Shelnut-Florida)
W71-11631

A CHALLENGE TO THE CALIFORNIA WATER PLAN,
For primary bibliographic entry see Field 05G.
W71-11632

RULES AND REGULATIONS COVERING DISPOSAL OF WASTES FROM WATERCRAFT.
Texas State Dept. of Health, Austin.
For primary bibliographic entry see Field 05G.
W71-11633

CERTIFICATION OF CONFORMANCE WITH WATER QUALITY STANDARDS.
California Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W71-11634

FINANCIAL ASSISTANCE PROGRAMS (GRANT APPLICATION PROCEDURES).
California Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W71-11635

QUALITY CONTROL AND RE-USE OF WATER IN CALIFORNIA,
For primary bibliographic entry see Field 05G.
W71-11636

CONTROL OF STREAM POLLUTION,
For primary bibliographic entry see Field 05G.
W71-11637

RULE AND REGULATION FOR THE REGISTRATION OF FEEDLOTS.
Nebraska Water Pollution Control Council, Lincoln.
For primary bibliographic entry see Field 05G.
W71-11638

RULES AND REGULATIONS CONCERNING STATE CERTIFICATION TO APPLICANTS FOR FEDERAL LICENSES OR PERMITS TO CONDUCT ACTIVITIES ON NAVIGABLE WATERS OF THE UNITED STATES FLOWING THROUGH OR BORDERING THE STATE OF NEBRASKA.
Nebraska Water Pollution Control Council, Lincoln.
For primary bibliographic entry see Field 05G.
W71-11639

WATER POLLUTION CONTROL LAWS OF OREGON--PROBLEMS OF ENFORCEMENT,
For primary bibliographic entry see Field 05G.
W71-11641

PRACTICAL COMMENT: A LAWYER'S POLLUTION PRIMER,
For primary bibliographic entry see Field 05G.
W71-11642

6F. Nonstructural Alternatives

FLOOD PLAIN INFORMATION, EAST BRANCH PERKIOMEN CREEK, BUCKS COUNTY, PENNSYLVANIA.
Corps of Engineers, Philadelphia, Pa.
For primary bibliographic entry see Field 04A.
W71-11257

FLOOD PLAIN INFORMATION, MECKLENBURG COUNTY, NORTH CAROLINA, VOLUME 3. MALLARD CREEK, TOBY CREEK AND DOBY CREEK.
Corps of Engineers, Charleston, S.C.
For primary bibliographic entry see Field 04A.
W71-11258

FLOOD PLAIN INFORMATION, YELLOW CREEK AND LITTLE YELLOW CREEK, BENNETTS AND STONY FORKS, AND DIVERSION CANAL, MIDDLESBORO, KENTUCKY.
Corps of Engineers, Nashville, Tenn.
For primary bibliographic entry see Field 04A.
W71-11259

A NEW COURSE TO ARARAT,
Office of the Chief of Engineers (Army), Washington, D.C.
George R. Phippen.
Water Spectrum, Vol 3, No 2, p 8-15. Summer 1971, 6 illus, 5 photo.

Descriptors: *Flood plains, *Flooding, *Land use.
Identifiers: *Flood plain management, *Flood plain use.

Flood plain management combines the management of land and water into a single focus, and allows for appropriate flood plain use. Until a few years ago the focus of proposed and applied solutions to flooding had been on the modification of the flooding aspect. This article discusses planning aspects of flood plain management and Federal involvement in flood plain management. (Strachan-Chicago)
W71-11604

FLOOD-LOSS REDUCTION: THE INTEGRATED APPROACH,
Colorado Univ., Boulder. Inst. of Behavioral Science.
Gilbert F. White.
Journal Of Soil and Water Conservation, Vol 25, No 5, p 172-176. September-October 1970, 2 photo, 2 tab, 6 ref.

Descriptors: *Environment, *Flood damage, *Planning, *Multiple-purpose prospects, Flood plain insurance, Land use.
Identifiers: *Flood-loss reduction, *Integrated approach, Natural resources planning.

This article discusses the integrated approach to flood-loss reduction, a reorientation in all aspects of natural resources planning. The integrated approach sees management of land and water as employing flood-loss reduction, water storage, irrigation and low water flow control as means to achieve broader social aims than as ends in themselves. The central question involved with flood hazards is seen as whether man will dominate his environment with structural and upstream land treatment works or whether he will try to harmoniously adjust to his environment with additional technical tools such as flood proofing, flood warnings, land use regulation and land insurance. The integrated approach to flood-loss reduction allows man to adjust harmoniously to his environment because of its use of alternative means and aims. (Strachan-Chicago)
W71-11609

6G. Ecologic Impact of Water Development

ENVIRONMENT: A CHALLENGE FOR MODERN SOCIETY,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 06B.
W71-10971

OPEN SPACE FROM NATURAL PROCESSES,
Pennsylvania Univ., Philadelphia.
For primary bibliographic entry see Field 06B.
W71-10975

EFFECT OF JOHN DAY DAM ON DISSOLVED NITROGEN CONCENTRATIONS AND SALMON IN THE COLUMBIA RIVER, 1968,
Bureau of Commercial Fisheries, Seattle, Wash.
For primary bibliographic entry see Field 08I.
W71-11018

WEST FORK DES MOINES RIVER, JACKSON, MINNESOTA, LOCAL PROTECTION PROJECT.
Army Engineer District, Rock Island, Ill.
For primary bibliographic entry see Field 04A.
W71-11411

ENVIRONMENTAL PROBLEMS IN SOUTH FLORIDA.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.

Available from the National Technical Information Service as PB-199 159, $3.00 in paper copy, $0.95 in microfiche. Report of the Environmental Study Group to the Environmental Studies Board, March 1970. 76 p.

Descriptors: *Environmental effects, *Regional analysis, *Land use, *Flood control, Water conservation, Water pollution, Swamps, Pesticides, *Airports, Water quality, Air pollution, National parks, Public health, Nutrients.
Identifiers: *Environmental surveys, *Florida, *Regional planning, Land development, *Technology assessment, *Everglades National Park, Noise pollution, Big Cypress Swamp, Collier County, Florida.

The study applies the methods of technology assessment to help solve an acute environmental problem in South Florida; considers environmental effects of building a jetport near Everglades Park and concludes the site could be so used with adequate safeguards which are detailed; recommends further study of impact of a commercial jetport at the site; and strongly suggests intensified research in effect of insect vectors from a tropical reservoir on public health.
W71-11412

ROCKFISH CREEK, NORTH CAROLINA FLOOD CONTROL PROJECT.
Corps of Engineers, Wilmington, N.C. Wilmington District.
For primary bibliographic entry see Field 04A.
W71-11413

TETON BASIN PROJECT, IDAHO, APRIL, 1971.
Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as PB-198 688, $3.00 in paper copy, $0.95 in microfiche. Draft Environmental Statement, Wash. D.C., May 1971. 16 p.

Descriptors: *Environmental effects, *Dams, *Reservoirs, Recreation facilities, Idaho, Irrigation, Electric powerplants.
Identifiers: *Environmental surveys, Earthfills, Wildlife, *Environmental impact statements, *Teton Basin Project, Teton River.

The project involves the construction of the Teton Dam on the Teton River. This earthfill dam will be 300 feet in height above streambed, with a crest length of 3,000 feet. The 17-mile-long Teton Reservoir will have a total capacity of 300,000 acre-feet. A combined power and pumping plant will be constructed consisting of two 10,000 kilowatt units with space for installation of a third 10,000 kilowatt when needed. Teton Dam and Reservoir will eliminate summer and winter range utilized by big-game animals. Mitigation measures are planned to avoid the crowding of big-game animals on the remaining habitat upstream, particularly during the winter season. The construction of Teton Dam and impoundment of the water will create an important recreation area. The resources that will be involved in the construction of the project facilities will constitute an irreversible commitment. Also, alteration of the aesthetics of the canyon and possible impairment of the fish and wildlife resources are irreversible. The commitment of the water for irrigation with secondary power producing benefits would not be irreversible or irretrievable if higher uses should arise at some future time.
W71-11414

STUART GULCH DAM, IDAHO, PROJECT.
Corps of Engineers, Walla Walla, Wash. Walla Walla District.

Available from the National Technical Information Service as PB-198 722, $3.00 in paper copy, $0.95 in microfiche. Draft Environmental Statement, Walla Walla, 5 April 1971. 8 p.

Descriptors: *Environmental effects, *Dams, *Idaho, *Flood control, Construction, Silts, Idaho.
Identifiers: *Environmental surveys, *Environmental impact statements, *Boise.

Stuart Gulch project consists of a local flood detention dam on the intermittent stream in Stuart Gulch, a minor tributary of the Boise River. The damsite is located about 3,500 feet upstream from the mouth of Stuart Gulch in the foothills immediately north of the city of Boise, Idaho. The dam would be an earthfull structure 54 feet in height and 1,054 feet in length. About 194 acres of land would be required, eliminating one farmstead. A permanent impoundment would not be maintained behind the dam. The existing character of the land in the project area will be affected by periodic short-term inundation and silt deposition. Temporary disturbances will occur during the construction activity.
W71-11415

CLEAR CREEK, TEXAS, FLOOD CONTROL.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W71-11416

THE NATIONAL ENVIRONMENTAL SCIENCE TRIANGLE,
Senate, Washington, D.C.
For primary bibliographic entry see Field 05G.
W71-11440

U. S. NAVY R AND D EFFORTS IN ENVIRONMENTAL PROTECTION,
Naval Oceanographic Office, Washington, D.C.
For primary bibliographic entry see Field 05G.
W71-11450

THE STATE OF KNOWLEDGE WITH REGARD TO THE EFFECTS OF PHYSICAL AND CHEMI-

CAL ENVIRONMENTAL CONDITIONS ON MARINE BIOTA WITH EMPHASIS ON THE LONG ISLAND SITUATION.
New York Ocean Science Lab., Montauk. Center for the Environment of Man.
For primary bibliographic entry see Field 05C.
W71-11466

THE ECOLOGY OF THE NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11476

ENVIRONMENTAL PLANNING ENHANCES FLOOD CONTROL PROJECT.
For primary bibliographic entry see Field 04A.
W71-11612

NATURAL HAZARD IN HUMAN ECOLOGICAL PERSPECTIVE: HYPOTHESES AND MODELS,
Clark Univ., Worcester, Mass.
Robert W. Kates.
Economic Geography, Vol 47, No 3, p 438-451. July 1971, 5 fig, 11 ref.

Descriptors: *Hazards, *Model studies, *Ecology, *Environmental effects.
Identifiers: *Natural hazard, *Adjustment, *Human ecological perspective.

General and specific models are discussed of man's adjustment to natural hazards, a continuous process in which certain extreme happenings are identified as hazards of natural origin and harmful to man. The perspective focuses on man as the ecological dominant. Within this human ecological perspective, interactions between man and nature tend to be, in the short run, stable, homeostatic, and self-regulating. A rudimentary model of this short-run process of human adjustment is of main concern. Also presented are global hypotheses of natural hazards, the modeling of the ecological perspective of adjustment within a general systems framework, and finally, the general model is applied to an East African smallholder agricultural community where drought and adjustment to drought form essential features of the agricultural system. (Strachan-Chicago)
W71-11614

07. RESOURCES DATA

7A. Network Design

AQUIFER-TEST DESIGN, OBSERVATION AND DATA ANALYSIS,
Geological Survey, Washington, D.C.
Robert W. Stallman.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402-Price 40 cents. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter B1, 1971. 26 p, 10 fig, 1 tab, 46 ref.

Descriptors: *Aquifer characteristics, *Groundwater movement, *Drawdown, *Transmissivity, *Permeability, Aquifers, Storage coefficient, Water yield, Water wells, Hydraulics, Hydrogeology, Specific capacity, Specific yield, Darcys law.
Identifiers: *Aquifer tests, *Aquifer evaluation.

An aquifer test is a controlled field experiment made to determine the hydraulic properties of water-bearing and associated rocks. The test is made by observing groundwater flow that is produced by known hydraulic boundary conditions such as variations of head along a connected stream, pumping wells, changes in weight imposed on the land surface, or changes in recharge. The hydraulic boundary conditions may be imposed as part of the natural hydrologic system or by an act of man. In this report, most illustrative material is selected from analytical solutions for those situations in which drawdowns are imposed on the aquifer. Discussion is limited to aquifer tests involving pumping wells. The general techniques described are equally effective for analyzing flows that are regulated by changing stream stages, except that time and space scales need to be modified. Reader familiarity with the general concept of aquifer testing is presumed. (Knapp-USGS)
W71-11264

A PROPOSED STREAMFLOW DATA PROGRAM FOR CALIFORNIA,
Geological Survey, Menlo Park, Calif.
J. R. Crippen, and R. M. Beall.
Geological Survey Open-file report, August 25, 1970. 82 p, 3 fig, 10 tab, 8 ref, append.

Descriptors: *Streamflow, *Project planning, *Network design, *Data collections, *California, Hydrologic data, Reviews, Evaluation, Stream gages, Flow characteristics, Flow measurement, Water yield, Water resources development, Gaging stations, Statistical models, Mathematical models, Regression analysis.
Identifiers: *Sacramento River basin (Calif), Streamflow characteristics, Basin characteristics, Program planning.

The streamflow data available for California are evaluated and guidelines for planning future programs are presented. Basic steps in the evaluation procedure were (1) definition of the long-term goals of the streamflow data program in quantitative form, (2) examination and analysis of all available data to determine which goals have been achieved, and (3) consideration of alternative programs and techniques to meet remaining objectives. Deficiencies in the present network are pointed out, and a streamflow data program is proposed for the future. (Woodard-USGS)
W71-11360

MEMBRANE FILTER TECHNIQUE INNOVATIONS,
Denver Board of Water Commissioners, Colo.
For primary bibliographic entry see Field 05A.
W71-11499

7B. Data Acquisition

FRACTIONATION OF INORGANIC PHOSPHATE IN CALCAREOUS LAKE SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Lab.
J. D. H. Williams, J. K. Syers, R. F. Harris, and D. E. Armstrong.
Soil Science Society of America Proceedings, Vol 35, No 2, p 250-255, 1971. 8 fig, 9 tab, 31 ref. B-022-WIS.

Descriptors: *Analytical techniques, *Distillation, *Phosphorus, Calcarious soils, Lakes, Sediments, Iron, Aluminum, Calcium, Calcite, Sorption, Phosphates.
Identifiers: Inorganic phosphates, Reagents, Calcium fluoride, Fractionation procedure, Lake Wingra (Wis), Lake Monona (Wis), Lake Mendota (Wis), Lake Delavan (Wis), Lake Geneva (Wis).

Previous fractionation procedures for inorganic phosphorus of calcareous soils and lake sediments have underestimated nonoccluded iron-and aluminum-bound phosphorus and overestimated calcium-bound and occluded iron-bound phosphorus. The authors propose a fractionation scheme for inorganic phosphorus of calcareous materials comprising successive single extractions with sodium hydroxide, citrate-dithionite-bicarbonate, and hydrogen chloride. The procedure removed 90% of the total inorganic phosphorus from lime-enriched sediments of Wisconsin hardwater lakes. (Wilde-Wisconsin)
W71-11005

A METHOD FOR CONFIRMATION OF ORGANOPHOSPHORUS COMPOUNDS AT THE RESIDUE LEVEL,
Food and Drug Administration, Perrine, Fla. Perrine Primate Research Branch.
M. T. Shafik, Diane Bradway, and Henry F. Enos.
Bulletin for Environmental Contamination and Toxicology, Vol 6, No 1, p 55-66, 1971. 2 fig, 2 tab, 8 ref.

Descriptors: *Organophosphorus compounds, *Analytical techniques, Hydrolysis, Gas chromatography, Insecticides, Pesticides, Phosphothidate pesticides, Analysis, Measurement.
Identifiers: *Residue level, Trialkyl phosphates, Dialkyl phosphates.

Determination of the optimum conditions necessary to obtain maximum hydrolysis of a wide variety of organophosphorus insecticides to their corresponding dialkyl phosphates or thiophosphates was the purpose of this investigation. A very useful confirmatory procedure was found using the appropriate hydrolysis conditions coupled with gas chromatography. Three methods are presented for the hydrolysis and alkylation of insecticides containing alkyl phosphate groups. General procedures are given with specific details concerning the normality of base needed and the time and temperature of hydrolysis. The products resulting from each of the hydrolysis procedures are identified and quantitated by the gas chromatographic method. The most generally applicable method (Method 1) involves hydrolysis of organophosphate under various conditions and alkylation of the entire hydrolysate, and can be applied to both microgram and nanogram quantities of most dimethyl-substituted organophosphorus insecticides, as well as many of the diethy-substituted compounds. The only compounds which did not give satisfactory hydrolysis by this procedure were in those groups containing diethyl phosphate and diethyl phosphorothiolate moieties and the three compounds Dursban, malathion and Guthion. Additional information concerning the identity of organophosphorus insecticides may be obtained using the hydrolysis procedures described. (Jones-Wisconsin)
W71-11007

DIFFERENCES IN ABUNDANCE OF BENTHOS AND RELIABILITY OF ITS ASSESSMENT IN SEVERAL LAKE HABITATS,
Warsaw Univ. (Poland). Chair of Hydrobiology.
For primary bibliographic entry see Field 05C.
W71-11010

DETERMINATION OF MERCURY IN BIOLOGICAL AND ENVIRONMENTAL SAMPLES BY NEUTRON ACTIVATION ANALYSIS,
Western New York Nuclear Research Center, Inc., Buffalo.
For primary bibliographic entry see Field 05B.
W71-11036

MODEL ECOSYSTEM FOR THE EVALUATION OF PESTICIDE BIODEGRADABILITY AND ECOLOGICAL MAGNIFICATION,
Illinois Univ., Urbana. Dept. of Zoology; and Illinois Univ., Urbana. Dept. of Entomology.
For primary bibliographic entry see Field 05B.
W71-11067

GULF STREAM AND MIDDLE ATLANTIC BIGHT: COMPLEX THERMAL STRUCTURE AS SEEN FROM AN ENVIRONMENTAL SATELLITE,
National Oceanic and Atmospheric Administration, Hillcrest Heights, Md., National Environmental Satellite Service.
P. K. Rao, A. E. Strong, and R. Koffler.
Science, Vol 173, No 3996, p 529-530, August 6, 1971. 2 p, 1 fig, 2 ref.

Descriptors: *Water temperature, *Oceans, *Gulfs, *Remote sensing, *Satellites (Artificial),

Analytical techniques, Infrared radiation, Photogrammetry.
Identifiers: *Water temperature (Gulf Stream).

High-resolution infrared imagery from the ITOS 1 satellite demonstrates the utility of synoptic sea-surface temperature information. The northern edge of the Gulf Stream, the slope waters, and the shelf waters display complex thermal characteristics with distinct temperature gradients separating these three water masses. This type of information can be very useful for increasing understanding of many physical phenomena that occur over Earth's oceans.
W71-11086

EFFECTS OF EXPOSURE ON THE CATCH OF RAIN GAUGES,
Water Research Association, Medmenham (England). Resources Group.
M. J. Green.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 19, No 2, p 55-71, 1970. 17 p, 10 fig, 5 tab, 11 ref.

Descriptors: *Rain gages, *Calibrations, Instrumentation, On-site tests, Rainfall, Standards, Water measurement, Measurement.
Identifiers: *Experimental watersheds.

United Kingdom Meteorological Office Mk-2 gages were installed at various heights above ground and their catch compared with that of a nine-hole gage mounted close to the ground. An experiment was devised to examine the effect of rim height on catch and also the effect of the size of an anti-splash grid surround. Various values of wind speed and rain inclination were considered. A Mk-2 gage with rim at 30.5 cm caught 3.2% less than the mean catch of the nine-hole gage, and when a Mk-2 with rim at 30.5 cm was surrounded by a turf wall the catch was within 1% of the mean catch of the nine-hole gage. IRPG and Mk-2 funnels at 1 meter and 2 meters caught 4%, 6% and 10%, respectively, less than the mean catch of a nine-hole gage. A 5-inch gage set in a pit with its rim flush with the ground surface and surrounded by a 90X90 cm polystyrene grid caught 2.5% more than the mean catch of the nine-hole gage. The hillside nine-hole gage, facing into the predominant rain direction, did not exhibit evidence of in-splash and showed a 6% greater catch than the hilltop gage. The difference between the hillside nine-hole gage and the other gages mounted at 30.5 cm perpendicular to the slope and vertical was 8% and 26% respectively. The effect of rim height on loss of catch was highly significant but in-splash was not significant above a rim height of 7.5 cm. (Knapp-USGS)
W71-11100

DESIGN OF A HAND-PORTABLE RAINFALL-SIMULATING INFILTROMETER, WITH TRIAL RESULTS FROM THE OTUTIRA CATCHMENT,
Waikato Univ., Hamilton (New Zealand). Dept. of Earth Sciences.
M. J. Selby.
In: Wellington Symposium - The Results of Research on Representative and Experimental Basins; December 1-8, 1970, New Zealand: New Zealand Journal of Hydrology, Vol 9, No 2, p 117-132, 1970. 16 p, 7 fig, 18 ref.

Descriptors: *Infiltrometers, *Rainfall simulators, *Infiltration, *Instrumentation, Calibrations, Percolation, Soil water movement, Simulated rainfall, Land management, Soil conservation, Erosion control.
Identifiers: *New Zealand, *Experimental watersheds.

Comparison of the relative rate of infiltration of precipitation into the soil is an important part of studies of the effectiveness of various treatment practices in reducing runoff and erosion. An instrument was constructed, based on a United States Geological Survey design, which requires only one man and little water to run tests. It is rugged in construction, does not disturb the soil and can be used on slopes. The instrument consists of a raindrop maker, a box with a thick base through which are drilled 91 holes; in each hole is a wire which acts as a drop former. Initial tests of the infiltrometer have been carried out on soils from the Otutira (N. Z.) catchment on yellow-brown pumice soils. The results indicate the accuracy of the instrument and the high degree of variation of infiltration rates on the pumice soils. A trial on a total of 108 samples shows markedly lower infiltration rates beneath pasture grasses compared with soils beneath manuka scrub or ungrazed grass.
W71-11102

ANALYSIS OF CURRENT-METER DATA AT COLUMBIA RIVER GAGING STATIONS, WASHINGTON AND OREGON,
Geological Survey, Washington, D.C.
John Savini, and G. L. Bodhaine.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price 40 cents. Geological Survey Water Supply Paper 1869-F, 1971. 59 p, 16 fig, 10 tab.

Descriptors: *Current meters, *Streamflow, *Stream gages, *Flow measurement, *Instrumentation, On-site tests, Analytical techniques, Data collections, Velocity, Gaging stations, Discharge measurement, Investigations.
Identifiers: *Streamflow computations.

The U.S. Geological Survey developed equipment to measure stream velocity simultaneously with 10 current meters arranged vertically and to measure velocity closer to the streambed than attainable with conventional equipment. With the 10 current meters, synchronous velocities were recorded for a period of 66 minutes at 10 different depths in one vertical of one gaging-station cross section. In addition, with a current meter installed on a special bracket to allow measurements to 0.5 foot above streambed, data were obtained at two to four verticals in four gaging-station cross sections. The standard deviation, expressed in feet per second, of the velocity at each point in the vertical tended to increase with depth--from 0.16 fps at 0.05 depth to a maximum of 0.24 fps at 0.75 depth. Determining the mean velocity by averaging the 10-point observations of the 66-minute run proved to be as accurate as by plotting the vertical velocity curve (from the averaged 10 points) and then integrating the depth-velocity profile. (Woodward-USGS)
W71-11108

RADIATION MEASUREMENT OF SOIL DENSITY AND MOISTURE CONTENT IN AGROPHYSICAL STUDIES (O radiometrii plotnosti i vlazhnosti pochv v agrofizicheskikh issledovaniyakh),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
For primary bibliographic entry see Field 02G.
W71-11125

APPLICATION OF AN ACOUSTIC STREAMFLOW-MEASURING SYSTEM ON THE COLUMBIA RIVER AT THE DALLES, OREGON,
Geological Survey, Menlo Park, Calif.
W. Smith.
Water Resources Bulletin, Vol 7, No 1, p 69-78, Feb 1971. 10 p, 7 fig.

Descriptors: *Discharge measurement, *Flow measurement, Rivers, Dams, Stream channels, Gaging Stations, Open channel flow, Acoustics, Sound waves, Accuracy, *Acoustic equipment, Backwater, Calibrations, Velocity meters, *Transducers, Flowmeters, Streamflow records, Streamflow, Water management (Applied), Velocity.
Identifiers: Columbia River, The Dalles, Oreg, *Acoustic velocity meters.

The need for accurate, independent records of flow on the Columbia River at The Dalles, Oreg, has been met by the installation of an acoustic streamflow-measuring system. The device provides an index of the velocity of flow by measuring the difference in travel times of acoustic pulses transmitted through the water in each direction along a diagonal path across the river. The flow of water along the path increases the speed of one signal and retards the speed of the other. The difference in time of travel is related linearly to the water velocity along the path. Installation of the system, which is the first application of an acoustic flowmeter in a large natural channel, was completed in April 1969, and has been in continuous operation since that date. The velocity index and water-surface elevation are used as a 2-variable index in the computation of flow. These variables, correlated against current-meter measurements made by use of specialized boat equipment, provide a reliable basis for computations of instantaneous and daily mean discharges. (USBR)
W71-11151

THE CPA'S ROLE IN RESTORING THE ECONOMICAL BALANCE,
Price Waterhouse and Co, Philadelphia, Pa.
H. S. Sawin.
Management Advisor, Vol 8, No 2, p 22-29, Mar-Apr 1971. 8 p, 1 fig.

Descriptors: *Ecology, *Balance of nature, Environmental effects, Data collection systems, Environments, Resource conservation, Planning, Water pollution, *Pollution abatement, Pollution control, Water quality, Water supply, Pennsylvania, Industrial wastes, *Computer programs, Management, Computer systems hardware, Sewage, Training, Information systems.

A short-run program using systems technology and the power of advanced computer hardware to measure and control pollution is described. The program is being developed by the Commonwealth of Pennsylvania with financial assistance at the Federal level from the Office of Water Quality, Environmental Protection Agency, and the professional assistance of the American Institute of Certified Public Accountants' Management Advisory Services Department. The program is the first statewide, comprehensive system for processing and retrieving water quality control information. The immediate objective of the project is to establish a workable information system which will assist Pennsylvania's Bureau of Sanitary Engineering in planning, directing, evaluating, and administering the water quality management program of the state. The second objective is to develop a system that can be adopted by other state, regional, and Federal water pollution control agencies. This long-range program, of which many initial important steps have been completed, is expected to enable Pennsylvania to better manage the quality of its water, and to provide a model system from which other states and agencies can benefit. (USBR)
W71-11157

THERMAL MONITORING OF LEAKAGE THROUGH DAMS,
Occidental College, Los Angeles, Calif. Dept. of Geology; and Geothermal Surveys, Los Angeles, Calif.
For primary bibliographic entry see Field 08D.
W71-11208

STANDARDIZED WATER ANALYSES AND THEIR APPLICATION TO RIVER SURVEYS IN NATAL,
National Inst. for Water Research, Durban (South Africa). Natal Regional Lab.
For primary bibliographic entry see Field 05A.
W71-11211

COMPARISON OF METHODS FOR EVALUATING AQUIFER CHARACTERISTICS,
Hittman Associates, Columbia, Md. Environmental Sciences and Engineering Dept.

For primary bibliographic entry see Field 02F.
W71-11215

POLLUTION DETECTION BY REMOTE SENSING,
American Chemical Society, Washington, D.C.
For primary bibliographic entry see Field 05A.
W71-11220

METHODS EMPLOYED IN STUDYING THE MIXING MECHANISM AT THE CONFLUENCE OF THE BROAD AND SALUDA RIVERS, COLUMBIA, SOUTH CAROLINA,
South Carolina Univ., Columbia.
For primary bibliographic entry see Field 02J.
W71-11222

INSTRUMENTAL TECHNIQUES FOR THE IDENTIFICATION OF POLLUTANTS,
Rocketdyne, Canoga Park, Calif. Environmental Sciences and Technology.
For primary bibliographic entry see Field 05A.
W71-11237

MICRODETERMINATION OF URONIC ACIDS AND RELATED COMPOUNDS IN THE MARINE ENVIRONMENT,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 05A.
W71-11248

STUDY TO EVALUATE THE UTILITY OF AERIAL SURVEILLANCE METHODS IN WATER QUALITY MONITORING,
North American Rockwell, El Segundo, Calif. Space Div.
For primary bibliographic entry see Field 05A.
W71-11250

A COMPARISON OF THREE MEDIA IN DETERMINATION OF BACTERIAL CONTENT OF SEDIMENTS IN BARATARIA BAY,
Louisiana State Univ., Baton Rouge. Dept. of Microbiology.
For primary bibliographic entry see Field 02L.
W71-11284

SOME NOTES ON FISH COLLECTED IN THE BARATARIA BAY, LOUISIANA REGION,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
For primary bibliographic entry see Field 02L.
W71-11286

A DATA ACQUISITION SYSTEM FOR MEASUREMENT OF METEOROLOGIC-HYDROLOGIC PARAMETERS IN A REMOTE ESTUARINE ENVIRONMENT,
Louisiana State Univ., Baton Rouge. Office of Sea Grant Development.
For primary bibliographic entry see Field 02L.
W71-11287

POTENTIAL APPLICATION OF AN INFRARED SPECTRORADIOMETER FOR REMOTE DETECTION AND IDENTIFICATION OF OIL SLICKS ON WATER,
Gulf General Atomic Co., San Diego, Calif.; and Cincinnati Univ., Ohio. Dept. of Chemistry; and Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.; and Aerospace America, Inc., Bay City, Mich.
For primary bibliographic entry see Field 05A.
W71-11288

A SAMPLER FOR CONCENTRATING RADIONUCLIDES FROM NATURAL WATERS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 05A.
W71-11295

IMAGING TECHNIQUES FOR OIL POLLUTION SURVEY PURPOSES,
Earth Satellite Corp., Washington, D.C., Geosciences and Environmental Applications.
For primary bibliographic entry see Field 05A.
W71-11349

1971 PILOT STUDIES--REMOTE SENSING AND ICE MORPHOLOGY.
Washington Univ., Seattle Div. of Marine Resources.

AIDJEX Bulletin No 5, Feb 1971. 59 p.

Descriptors: *Remote sensing, *Sea ice, *Arctic, Surveys, Radar, Profiles, Topography, Currents (water), Wind, Ice, Sea water, Water circulation.
Identifiers: AIDJEX.

This Bulletin describes in detail the Arctic Ice Dynamics Joint Experiment/remote-sensing and ice morphology pilot studies, summarizes plans, and gives an account of the Numerical Modeling Working Group session. Any consideration of ice movement must start with the morphology of the two surfaces of an ice cover, since it is the roughness of these surfaces which couples the air-ice-water media and permits momentum transfers. The major driving force causing ice movement is the shear force applied to the upper surface by the wind. The lower surface interacts with the water, transferring momentum to it, so that the water stress on the ice is a drag. Although local measurements of surface relief will probably be made at the manned stations, these will be limited in scale by the heavy manpower requirements for such observations. The solution lies in the direction of rapid remote sensing of the ice cover from airborne and submarine platforms. The design of the remote sensing of the ice cover from AIDJEX 1971 involves two phases: (1) detailed measurements at low altitudes of a small area of ice; and (2) large-scale measurements at great altitudes of a large part of the ice canopy. (Knapp-USGS)
W71-11355

A METHOD TO DESCRIBE THE FLOW OF RADIOACTIVE IONS IN GROUND WATER,
Geological Survey, Denver, Colo.
David B. Grove.
Available from Nat. Tech. Inf. Service, Springfield, Va. 22151 Price $3.00 printed copy, 95 cents microfiche. Sandia Laboratories Contract Report SC-CR-70-6139, Dec 1970. 38 p, 4 fig, 1 tab, 17 ref.

Descriptors: *Path of pollutants, *Radioisotopes, *Groundwater movement, *Dispersion, *Ion exchange, Diffusion, Mixing, Radioactivity, Radiation, Radioactive wastes, Ions, Equations, Mathematical models, Convection, Nuclear powerplants.

An equation based on instantaneous ion exchange and on a linear adsorption isotherm predicts radioactive ionic concentrations in groundwater systems as a function of time and position. This equation accounts for radioactive decay, ion exchange, and longitudinal hydraulic dispersion. Data necessary for solution include groundwater velocity, ion-exchange distribution coefficient, exchange ratio, and dispersion coefficient. The need for simplicity dictates the use of an equilibrium concept rather than a rate process to describe the ion-exchange reaction. (Knapp-USGS)
W71-11356

ANALYSIS AND FORECAST OF THE MARINE POLLUTION CONTROL MARKET,
Technical Marketing Associates.
For primary bibliographic entry see Field 05G.
W71-11456

AERIAL PHOTOGRAPHIC STUDIES OF THE COASTAL WATERS OF NEW YORK AND LONG ISLAND,
New York Ocean Science Lab., Montauk. Center for the Environment of Man.
Mahlon Kelly, and Louis Castiglione.
New York Ocean Science Laboratory, Technical Report No. 0005, November 12, 1970. 55 p, 4 tab, 11 fig, 14 ref. Naval Oceanographic Office Contract N62306-70-A-0073-0003.

Descriptors: *Coasts, *Aerial photography, *Data collections, *Remote sensing, Suspended load, Temperature, Color, Phytoplankton, Sewage, Dredging, New York, Water pollution effects.
Identifiers: Long Island (N.Y.).

Aerial and satellite imagery missions were conducted over the New York, Long Island coastal areas to define significant distribution patterns of coastal benthic vegetation and suspended materials in the water. These distributions are of importance in understanding coastal processes and for proper planning of coastal use. Bottom vegetation is a good indicator of environmental conditions and patterns of water color caused by light backscattered from suspended materials reflect oceanographic conditions such as water-mass boundaries, chlorophyll concentration, phytoplankton populations, suspended sediments and mans influence such as dredging, filling, and sewage. Comparisons of different photographic films, photoenhancement, water characteristics and photointerpretation are discussed. (Ensign-PAI)
W71-11467

SEMI-AUTOMATED DETERMINATION OF MERCURY IN FISH TISSUE,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 05A.
W71-11471

COASTAL EROSION IN NORTH CAROLINA,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11477

EXPERIENCE WITH A CENTRALLY LOCATED WATER QUALITY MONITORING SYSTEM IN LARGE STEAM-ELECTRIC GENERATING PLANTS,
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 05A.
W71-11483

OBSERVATIONS OF CARBON DIOXIDE IN THE SURFACE WATERS OF THE EASTERN NORTH PACIFIC OCEAN AND THE BERING SEA,
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
For primary bibliographic entry see Field 05A.
W71-11492

CHLORINE RESIDUAL ANALYZER/MONITOR CHALLENGES NEED FOR SIMPLICITY, ACCURACY, RELIABILITY,
Capital Controls Co., Inc., Colmar.
For primary bibliographic entry see Field 05A.
W71-11518

THE USE OF COLLABORATIVE STUDIES TO EVALUATE WATER ANALYSIS INSTRUMENTS,
Environmental Control Administration, Cincinnati, Ohio.
For primary bibliographic entry see Field 05A.
W71-11532

ARSENIC IN POTABLE DESERT GROUNDWATER: AN ANALYSIS PROBLEM,
Naval Weapons Center, China Lake, Calif.
For primary bibliographic entry see Field 05A.
W71-11552

CRITERIA FOR JUDGING ACCEPTABILITY OF ANALYTICAL METHODS,
Food and Drug Administration, Los Angeles, Calif.
For primary bibliographic entry see Field 05A.
W71-11569

INTERLABORATORY COMPARISON OF ANALYSIS OF TRITIUM IN NATURAL WATERS,
International Atomic Energy Agency, Vienna (Austria).
For primary bibliographic entry see Field 05A.
W71-11574

7C. Evaluation, Processing and Publication

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS,
Federal Water Quality Administration, Cincinnati, Ohio. Analytical Quality Control Lab.
For primary bibliographic entry see Field 05C.
W71-11026

EVALUATION OF MEASUREMENT ERRORS BY REPEATED PUMPING TESTS,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 02F.
W71-11073

EFFECT OF LOW-FLOW HYDROLOGIC REGIMES ON WATER QUALITY MANAGEMENT,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 05G.
W71-11201

THE SYNTHESIS OF FLOWS IN NORTH CAROLINA STREAMS FOR COMPUTER SIMULATION EXPERIMENTS,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 02E.
W71-11202

DRAWDOWN IN A WELL GROUP ALONG A STRAIGHT LINE,
Northwestern Univ., Evanston, Ill. Technological Inst.; Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering; and Wisconsin Univ., Milwaukee. Dept. of Mechanics.
For primary bibliographic entry see Field 02F.
W71-11216

WATER RESOURCES DATA FOR KANSAS, PART 2. WATER QUALITY RECORDS.
Geological Survey, Lawrence, Kans.

Available from District Chief, Water Resources Div., U. S. Geological Survey, P.O. Box 3267, Lawrence, Kansas 66044. Geological Survey Basic Data Duplicated Report, 1971. 201 p, 2 fig, 4 tab, 16 ref.

Descriptors: *Water quality, *Surface waters, *Groundwater, *Data collections, *Kansas, Annual, Chemical analysis, Water temperature, Sediment transport, Particle size, Streamflow, Discharge measurement, Flow rates, Hydrologic data, Aquifer characteristics, Water wells.
Identifiers: *Basic-data.

Water-resources data for the 1969 water year (Oct. 1, 1968-Sept. 30, 1969) for Kansas include records of data for the chemical and physical characteristics of surface and groundwater. Records for a few pertinent water-quality stations in bordering States are also included. The water-quality records include descriptions of the sampling stations and tabulations of the data for the samples analyzed. The description of the sampling station gives the location, drainage area, periods, and general remarks. For groundwater sampling sites, the well number, depth of well, date of sampling, and other pertinent data are given in the table containing the chemical analyses of groundwater. Water-temperature data represent once-daily observations from which daily minimums and maximums are obtained. Fluvial sediment information is given for suspended-sediment discharges and concentrations and for particle-size distribution of suspended sediment and bed material. (Woodard-USGS)
W71-11265

HYDROLOGIC AND SHRIMP POPULATION MODELS,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 02L.
W71-11285

HOW GOOD ARE ANALYSES OF OILS BY GLC (gas liquid chromatography),
Department of Agriculture, Philadelphia, Pa. Eastern Utilization Research and Development Div.
S. F. Herb, and V. G. Martin.
Journal of the American Oil Chemists' Society, Vol 47, No 11, p 415-421, November 1970. 1 fig, 12 tab, 3 ref.

Descriptors: Quality control, Statistical methods, Analytical techniques, Computer programs, Performance, *Gas chromatography, Water analysis.

The Smalley Gas Chromatographic Subcommittee of the American Oil Chemists' Society is composed of a group of analysts from various plants, laboratories, and universities in the U.S., Sweden, and Canada. To fulfill its objective of promoting better and more uniform analysis, the Subcommittee has developed a procedure employing statistical methods whereby the performance of various analysts, based upon their analysis of known and unknown samples, can be appraised. The results of the analyses are treated statistically by computer for calculation of means, deviations from the mean, standard deviations, and other statistical parameters. By comparing individual results with mean or known value, individual performances can be determined. When analyses of several types of oils were performed by the analysts, application of the statistical treatments showed which analyses were most difficult. Sample results are shown. (Little-Battelle)
W71-11301

DIVERSE - A FORTRAN IV PROGRAM TO CALCULATE DIVERSITY INDICES OF STREAM BOTTOM ORGANISMS,
Massachusetts Univ. Amherst, Water Resources Research Center.
Joseph C. Mawson, and Paul J. Godfrey.
Available from the National Technical Information Service as PB-202 161, $3.00 in paper copy, $0.95 in microfiche. Massachusetts University Water Resources Research Center Project Report, 1971. 23 p, 8 ref, append. OWRR Project B-004-MASS (5).

Descriptors: *Computer programs, *Benthos, *Data processing, *Environmental effects, *Biological communities, Statistics, Data collections, Population, Water pollution effects, Distribution patterns, Ecology, Ecological distribution.
Identifiers: *Diversity index.

The description of stream bottom communities, an important part of most ecological studies, requires extensive calculations before analysis or use. A computer program was developed to generate several of the community descriptions sometimes referred to collectively as 'diversity indices'. The program was designed specifically for a study of benthic macroinvertebrates in a polluted river, but the indices can be used in the study of many types of communities. Diverse is designed to run on a medium to large computer which accepts Fortran IV and allows up to 13,000 bits of storage and has either a drum, disc, or scratch tape storage unit. The program accepts a maximum of 99 different species. (Knapp-USGS)
W71-11313

GEOSECTION INDICES FOR ENVIRONMENTAL DATA,
Wyoming Univ., Laramie. Water Resources Research Inst.
John C. Bellamy.
Available from the National Technical Information Service as PB-202 162, $3.00 in paper copy, $0.95 in microfiche. Wyoming University, Water Resources Research Institute Information Circular No 65, May 1970. 35 p, 7 ref. OWRR Project A-001-WYO (41) ESSA Contract E-12-70 (N).

Descriptors: *Data collections, *Data storage and retrieval, *Meteorological data, *Data processing, *Documentation, Information retrieval, Classification, Weather data, Maine, Wyoming, Hydrologic data.
Identifiers: *Data indexing, Geosection index.

A system of 'geosection' index numbers is proposed for cross-indexing many different kinds of environmental data. These index numbers basically identify the horizontal sections of the Geosphere to which any particular environmental data pertain. They thereby provide especially for identifying observing stations, and hence for ordering indexes, tabulations and files of environmental data from observing stations in a widely applicable and systematically interrelated way. These 'geosection' subdivisions of the Geosphere are also interchangeably representable with either the common alpha-numeric or more pictographic forms of the numerals or indices that make up such index numbers. (Knapp-USGS)
W71-11314

ENVIRONMENTAL ASPECTS OF THE UNITS PROBLEM,
Wyoming Univ., Laramie.
John C. Bellamy.
Available from the National Technical Information Service as PB-202 225, $3.00 in paper copy, $0.95 in microfiche. Wyoming University Water Resources Research Institute Information Circular No 68, May 1971. 29 p, 1 tab, 8 ref. OWRR Project A-001-WYO (43) ESSA Contract E-12-70 (N).

Descriptors: *Measurement, *Reviews, *Calibrations, *Instrumentation, Methodology, Evaluation, Liquids, Weight, Volume, Velocity.
Identifiers: *Measurement (Metric system), *Metric system.

This Information Circular is one of a series concerned with a newly conceived and formulated 'Geospheric System' of defining and identifying 'Geounits' for coordinating human activities to the characteristic nature of our Earth-centered or Geospheric environment. Timely consideration (pro and con) of converting to the metric system in the United States is provided. (Woodard-USGS)
W71-11315

FLOOD ROUTING IN THE JAMES RIVER,
Virginia Polytechnic Inst., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W71-11317

A COMPUTER MODEL OF FLOOD FLOWS IN THE JAMES RIVER,
Virginia Polytechnic Inst., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W71-11318

SIMULATION OF WATER QUALITY IN STREAMS AND CANALS,
Masch (Fred D.) and Associates, Austin, Tex; and Texas Water Development Board, Austin.
For primary bibliographic entry see Field 05B.
W71-11352

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE RED RIVER BASIN, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W71-11353

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE COASTAL BASINS OF TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02L.
W71-11354

MATHEMATICAL MODEL FOR APPROXIMATING TRANSIENT, THREE-DIMENSIONAL GROUNDWATER SYSTEMS,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Lab; and Montana Univ., Missoula.
For primary bibliographic entry see Field 02F.
W71-11359

POTENTIAL METHODS OF INDEXING DIURNAL WEATHER OBSERVATIONS,
Wyoming Univ., Laramie. Natural Resources Research Inst.
Verne E. Smith.
Available from the National Technical Information Service as PB-202 229, $3.00 in paper copy, $0.95 in microfiche. Wyoming University, Water Resources Research Institute Information Circular No 67, May 1971. 22 p, 2 append. OWRR Project A-001-WYO (42) ESSA Contract E-12-70 (N)

Descriptors: *Data collections, *Data storage and retrieval, *Meteorological data, *Data processing, *Documentation, Information retrieval, Classification, Weather data, Maine, Wyoming, Hydrologic data.
Identifiers: *Data indexing, Geosection index.

Diurnal weather observations are made by the Weather Bureau, Army, Navy and Air Force (or WBAN) stations throughout the United States. This classification of observations is one of the main sources of weather information. Indexes of data availability are required that are ordered or that provide for sorting by station name, position, time or kind of observation. The National Weather Records Center recently compiled an experimental index of the availability of diurnal weather observations from Maine. The first part of the index is a map of Maine upon which station names and locations are depicted. One degree latitude and longitude lines are included on the map. Following the map there are 21 pages of several separate indexes in which lists of the availability of observational data are ordered successively by station name, year, elevation and latitude. The outstanding characteristic of this Maine Index is that it has been compiled from an automatic computer file. Another experimental form is an index of the availability of diurnal weather observations from Wyoming. The availability of data can readily be determined from this index with respect to station names, positions, times or kinds of observations. Its 'geosection' index-numbers show unit-areas as well as numerical values of latitude and longitude. Sorting in several ways (by name, position, etc.) is provided in this one index. (Knapp-USGS)
W71-11363

UNSTEADY FLOW TOWARD PARTIALLY PENETRATING ARTESIAN WELLS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 04B.
W71-11403

08. ENGINEERING WORKS

8A. Structures

HYDRAULIC JUMP TYPE STILLING BASINS FOR FROUDE NUMBER 2.5 TO 4.5,
Illinois State Water Survey, Urbana.
Nani G. Bhowmik.
Illinois Water Survey Report of Investigation 67, 1971. 31 p, 40 fig, 7 tab, 23 ref.

Descriptors: *Hydraulic design, *Energy dissipation, *Stilling basins, *Hydraulic jump, Froude number, Structures, Hydraulic structures, Supercritical flow, Spillways, Hydraulic models, Model studies.

Water flowing at the supercritical stage with very high velocity is detrimental to the stability of the channel. Stilling basins with provisions for dissipating excess amounts of energy are used to prevent the erosion of the channel and to form an efficient hydraulic jump. Since no satisfactory design criteria existed for stilling basins in the low Froude number range of 2.5 to 4.5, laboratory tests were conducted to investigate the possibilities of increasing the energy loss and shortening the required basin length for this particular range of Froude number. Tests were made in a 2-foot-wide glass-walled tilting flume. The hydraulic jumps on the horizontal floor were developed with the aid of a sluice gate. Jumps were forced to form in a particular location by the addition of appurtenances such as baffle blocks and end sills. Comparison of test data for the forced hydraulic jump with data from an ordinary hydraulic jump for the same Froude number shows that the energy loss can be increased, the required downstream depth of water can be about 5 percent less than the sequent depth, and the jump can be formed in a much shorter basin. (Knapp-USGS)
W71-11134

PARALLEL PROCESSING APPROACH TO BRIDGE PLANNING,
Carnegie-Mellon Univ., Pittsburgh, Pa.
A. K. C. Wong, and T. Au.
Proceedings, American Society of Civil Engineers, Journal of the Structural Division, Vol 97, No ST1, p 115-132, Jan 1971. 18 p, 18 fig, 3 tab, 3 ref, append.

Descriptors: *Bridges (Structures), Computers, *Computer applications, Programming languages, *Computer programs, Design, Planning, Evaluation, Structural engineering, *Decision making, Costs, Environments, Flow charts, Information, Topography.
Identifiers: Subroutines, Time sharing, Design analysis, Heuristic methods, Computer-aided design.

A mode of computer processing in planning and design of bridges which provides flexibility in searching, comparing, evaluating, and selecting available data from the project environment and potential design alternatives is presented. The computer program is written in A Programming Language (APL) and is suitable for structuring and manipulating basic data. The subroutines in the program can accept and manipulate arrays, and express them in semigraphic form. Input and output can be handled in conversational mode on time-sharing systems. (USBR)
W71-11147

AUTOMATIC DESIGN OF SHELL STRUCTURES,
Westinghouse Electric Corp., Tampa, Fla.
P. G. Smith, and E. L. Wilson.
Proceedings, American Society of Civil Engineers, Journal of the Structural Division, Vol 97, No. ST1, p 191-201, Jan 1971. 11 p, 10 fig, 7 ref, append.

Descriptors: *Shell structures, *Structural design, Arch dams, *Finite element method, Design, *Computer applications, Roofs, Design practices, Storage tanks, Structural engineering, Thin shell structures, Numerical analysis.

A computer-oriented method for designing a large class of shell structures is presented. The numerical approach is modeled after an experimental technique used to determine shapes for shell structures. In the experimental procedure, the shell geometry is obtained by loading a flexible membrane. The numerical method replaces the costly and time-consuming experimental approach with an efficient digital computer program. A finite element formulation of the problem of large displacements in membrane shells is used to determine the equilibrium configuration for the flexible membranes. The approach is general and can be applied to the design of shells having arbitrary geometry, material properties, thickness, and boundary conditions. The method is applied to the design of roof structures, arch dams, storage tanks, and a tubular joint. Evaluation of the stresses in these structures indicates that the use of membrane shapes represents a rational approach to the design of many civil engineering shell structures. (USBR)
W71-11148

SCENARIO FOR A THIRD COMPUTER REVOLUTION IN STRUCTURAL ENGINEERING,
S. J. Fenves.

Descriptors: *Computers, Computer programming, Computer programs, Data retrieval, *Computer systems hardware, Computer applications, Networks, History, Professional personnel, *Structural engineering, Calculations, Research and development, Design, Programming languages, Bibliographies, *Computer systems programs, Algorithms.
Identifiers: *Time sharing, Standardization.

On the basis of the analogy between the industrial revolution and the computer revolution, it would be expected that subsequent conferences on electronic computation would deal exclusively with time-shared computing; however, there has been a slower rate of materialization of time-sharing than predicted. The analogy shows that the computer revolution differs significantly from the industrial revolution. Some adverse factors affecting the structural engineering profession are examined, and their implications for computer use are analyzed. A solution is presented for the problems outlined, calling for a centralized agency to handle software manufacture for structural engineering. The mode of operation of the profession in such an environment is described. (USBR)
W71-11150

DESIGN OF MOSSYROCK ARCH DAM,
Harza Engineering Co., Chicago, Ill.
R. P. Wengler, and W. Y. J. Shieh.
Proceedings, American Society of Civil Engineers, Journal of the Power Division, Vol 97, No PO1, p 25-38, Jan 1971. 14 p, 10 fig, 3 tab, 5 ref, append.

Descriptors: *Arch dams, *Hydraulic models, Model tests, History, *Dam design, Power, Stress, *Double-curvature arch dams, Design, Foundations, Site selection, Trial-load method, Hydroelectric powerplants, Earthquake loads, Flood control, exploration, Investigations, Dams.
Identifiers: Layout, Design analysis.

Development of the layout and history of the design of the 606-ft-high Mossyrock Arch Dam are presented. A description of general project layout and foundation conditions is given, but the main emphasis is on the arch dam. The history of the design is traced from license application and planning report to final construction design. Selec-

tion of the final location from among several investigated was based on economics, foundation conditions, and relative advantages and disadvantages the location had on other features of the project. Results of final design analysis based on the trial-load method and model tests showed good agreement and verified that design criteria was met. Construction started in 1965, and the reservoir was completely filled for the first time in June 1969. (USBR)
W71-11152

LAWS AND PROCEDURES OF POWER PLANT SITING IN NEW ENGLAND.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 06E.
W71-11166

DESIGN OF STRUCTURE AND STRUCTURAL MODIFICATIONS OF SPECIAL IMPORTANCE FOR NORTH CAROLINA COAST,
North Carolina State Univ., Raleigh. Coastal Research Program.
For primary bibliographic entry see Field 02L.
W71-11480

DESIGN CRITERIA FOR SEWERAGE SYSTEMS.
Texas State Dept. of Health, Austin. Division of Waste water Technology and Surveillance.
For primary bibliographic entry see Field 05D.
W71-11640

8B. Hydraulics

TIDAL PRISM-AREA RELATIONSHIP IN A MODEL INLET,
California Univ., Berkeley. Hydraulic Engineering Lab.
I. V. Nayak.
Available from the National Technical Information Service as AD-721 293, $3.00 in paper copy, $0.95 in microfiche. Hydraulic Engineering Laboratory Report 24-1, Feb 1971. 70 p.

Descriptors: *Break waters, *Hydraulic models, *Mathematical models, *Model studies, Estuaries, Bays, Harbors, Inlets (Waterways), *Tides, Inland waterways, Weirs, Jetties.
Identifiers: Inland waterways, Model basins, Test methods, Harbor protection.

The study attempts to relate some of the variables that influence the behavior of tidal inlets, especially the tidal prism-area relationship for a model-size inlet which was investigated for the case of: (a) no jetties, (b) twin jetties. The results are compared with published data from field and model studies and are found to be fair in agreement.
W71-10991

HYDRAULIC JUMP TYPE STILLING BASINS FOR FROUDE NUMBER 2.5 TO 4.5,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 08A.
W71-11134

SURGE TANK ANALYSIS BY COMPUTER,
Acres (H. G.) and Co. Ltd., Niagara Falls (Ontario).
C. H. Atkinson, and D. L. R. Cronin.

Descriptors: Surges, *Surge tanks, *Transient flow, *Pressure tunnels, Hydraulic engineering, Hydraulics, *Fluid mechanics, Foreign research, Foreign projects, Computers, *Computer programs, Computer applications, Unsteady flow, Hydroelectric powerplants, Water hammer, Flow charts, Oscillations, Plant efficiencies, Analysis.
Identifiers: Pressure waves, *Computer-aided design, Iteration method, Colombia, South America.

General equations of unsteady flow are applied to successive elements in a hydraulic system by a computer to establish hydraulic transients at a project incorporating 4 surge chambers and an 8.5-km pressure tunnel. The design of a single surge tank or a combination of surge tanks in a system presents a relatively complex problem to hydraulic engineers engaged in hydroelectric design because the hydraulic transients being studied are influenced by many design values. The mutual influence of these parameters normally necessitates the use of iterative solutions which must be repeated as various layouts and design capacities are investigated. The value of analog and digital computers in aiding the study of hydraulic transient problems has long been recognized, and several computer programs have been written. The application of a computer program to the complex surge tank system of the Alto Anchicaya Project illustrates the versatility of the program, and the speed of processing allows a more complete analysis of the surge response of the system with the expenditure of relatively little design time. (USBR)
W71-11145

DESIGN OF MOSSYROCK ARCH DAM,
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 08A.
W71-11152

CHANNEL PROCESSES ON REGULATED NAVIGABLE RIVERS (Ruslovyye protsessy na sudokhodnykh rekakh s zaregulirovannym stokom),
A. V. Serebryakov.
Moskva, Izdatel'stvo 'Transport', 1970. 128 p, 46 fig, 12 tab, 100 ref.

Descriptors: *Channel flow, *Regulated flow, *Navigable rivers, *Channel morphology, *Sedimentation, Runoff, Sediment yield, Hydrographs, Reservoir operation, Reservoirs, Discharge (Water), Probability, Water levels, Navigation, Channel erosion, Water temperature, Bed load, Particle size, Turbulent flow, Optimization.
Identifiers: *USSR, Don River, Tsimlyansk Reservoir, Stream competence, Nomograms.

The hydrologic regime and the characteristics of channel processes of regulated navigable rivers below large reservoirs were examined in connection with preparing recommendations for improving the collection of data needed to optimize regulation practices. The fundamental theoretical principles of channel formation contained in recent Soviet and Western literature were tested by laboratory and field investigations, including those by the author on the Don River before and after regulation of runoff. The choice of the Don River as a subject of hydrologic study was based on three considerations: (1) the similarity of the Don River in morphology and hydrography to many lowland rivers of the USSR; (2) the highly regulated flow of the Don River as a result of Tsimlyansk reservoir operation; and (3) the possibility of studying hydrologic characteristics of the Don River in 'pure' form without the presence of attendant and complicating factors. The practical aspects of optimization included the effect of changes in water temperature on channel processes and an examination of methods for improving navigable conditions on regulated rivers. (Josefson-USGS)
W71-11331

RECENT HYDROLOGIC INVESTIGATIONS IN THE DELTA AND POSSIBLE WATER LEVEL CONTROL MEASURES,
Provincial Dept. of Agriculture, Edmonton (Alberta).. Water Resources Div.
For primary bibliographic entry see Field 02H.
W71-11339

BUOYANT SLOT JETS INTO STAGNANT OR FLOWING ENVIRONMENTS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
For primary bibliographic entry see Field 05B.
W71-11340

TRANSITING COASTAL RIVER CHANNELS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
James M. Coleman, and W. G. McIntire.
Louisiana State University Coastal Studies Institute Technical Report No 97, 1971. 33 p, 17 fig, 14 ref. (Reprint of International Hydrographic Review, Vol 48, No 1, p 11-43, January 1971). ONR Contract No 00014-69-A-0211-0003, Project No NR 388 002.

Descriptors: *Navigation, *Alluvial channels, *Channel morphology, *Navigable rivers, Rivers, Mississippi River, Meanders, Braiding, Banks, Sand bars, Sand waves, Depth, Distribution patterns, Regime, State-discharge relations.
Identifiers: Alluvial channel navigation.

The major factor hampering navigation in an alluvial river is that most channels are constantly adjusting their cross-sectional area to differing flow regimes. In a meandering river, the thalweg remains fairly stable throughout a flood cycle. A braided channel, on the other hand, is just the opposite, as the thalweg tends to migrate rapidly and by fits and starts. Another major factor in determining both the position and depth of a river channel is the systematic change of the bottom topography that takes place under differing flow regimes. Sediment accretion or erosion on the channel floor is dependent on the relationships that exist between the size and quantity of sediment in transport and various hydraulic parameters. Water surface undulations are out of phase with the bedforms during the ripple and dune stage but in phase with the bed roughness elements in the upper flow regime. Water surface turbulence patterns offer the navigator some clues to proper navigation and also some insight into local bottom topography. (Knapp-USGS)
W71-11343

8C. Hydraulic Machinery

700/765-KV AC SUBSTATION DESIGN CRITERIA: SUMMARY OF INDUSTRY PRACTICES.

Institution of Electrical and Electronics Engineers Transactions, Power Applications Systems, Vol PAS-89, No. 7, p. 1521-1524, Sept/Oct 1970. 4 p, 1 tab, 9 ref.

Descriptors: *Substations (Electrical), *Extra high voltage, Reviews, *Design criteria, Electric power industry, Electric power, Transmission (Electrical), United States, Foreign design practices, *Electrical design, Electric utilities.
Identifiers: Canada, Tabulation.

Results of a survey of 3 major electric utility systems in the United States and Canada to determine major trends in substation design practices above 700 kv are tabulated for easy comparison of design features. These data are basically the criteria in use as of June 1, 1969, with significant variations explained in accompanying notes. The design information represents a major effort on the part of the companies who pioneered in this field, and the successful operation of systems in service is a tribute to the designers, contractors, and equipment manufacturers who participated in the ventures. This summary is a valuable reference and guide for those attempting 735/765-kv substation design, and serves as a permanent record of the state of the art at this point in time. (USBR)
W71-11144

COMPUTER'S ROLE IN TRANSMISSION LINE DESIGN,
Sargent and Lundy, Engineers, Chicago, Ill.
C. F. Beck.
Proceedings, American Society of Civil Engineers, Journal of the Structural Division, Vol 97, No ST1, p 63-79, Jan 1971. 17 p, 9 fig, 1 tab, 7 ref, append.

Descriptors: Computers, Design, *Computer applications, Transmission towers, *Transmission lines, Electrical design, Optimum design, Stress analysis, Surveying, Systems engineering, Safety, Economics, Structural design, Computer programs.
Identifiers: *Computer-aided design, *Computer tower position, Tower spotting, Transmission line hardware.

Experience gained in the development and use of computer techniques in designing transmission lines is reported. The computer acts as a catalyst providing the facility for implementing systems engineering concepts in a multidisciplineary environment. The design of a transmission line consists of: systems loading studies, selecting conductors and insulators, determining line routing, surveying the right-of-way, designing towers, tower spotting, ordering materials, and constructing the line. Interwoven are the criteria for the design, aesthetics, environmental conditions, and costs combining the interrelated interests of owner, engineer, fabricator, contractor, land owner, financier, and the public. With the aid of a computer, the mechanics of operation and interfacing between the many variables can be studied. The objective is to achieve the best solution by minimizing costs without infringing upon the aesthetic qualities or the integrity of the design. Functional and economical advantages are presented. (USBR)
W71-11146

AN ANALYTICAL AND EXPERIMENTAL STUDY OF A VORTEX PUMP,
Ingersoll-Rand Co., Princeton, N.J.
G. P. Schivley, and J. L. Dussourd.
Transactions of the American Society of Mechanical Engineers, Journal of Basic Engineering, Vol 92, Series D, 4, p 889-900, December 1970. 19 fig, 6 ref, 4 append.

Descriptors: *Centrifugal pumps, *Slurries, *Flow control, Mathematical models.
Identifiers: *Vortex pumps.

The fundamental flow phenomena that govern the performance of vortex pumps is discussed. These pumps have a large free and open passage that permits the pumping of solid material without danger of obstruction. A quantitative description is made of the governing hydraulics of the vortex type pumps. A simplified analysis which permits calculating the efficiency and the pressure-flow characterization in terms of the pump geometry is presented. Experimental results are given both for a research pump in which detailed flow measurements were taken for commercial pumps calibrated under conventional industrial testing procedure. Finally, comparison is made between the analytical and the test results. In general, fair agreement has been established between the simplified theory and the measurements both in regard to prediction of the internal flows and the prediction of the overall characteristics. Several areas are singled out where the theory could be improved. Other areas are singled out where empirical inputs are still needed, as a more powerful theory is required to predict those. (Mortland-Battelle)
W71-11535

CONTROL VALVES-CHARACTERISTICS AND DESIGN ASPECTS,
University Coll. of Wales, Aberystwyth.
O. G. Pamely-Evans.
Control and Instrumentation, Vol. 2, No. 12, p 27-30, December 1970. 11 fig, 3 ref.

Descriptors: *Valves, *Flow control, Design criteria, Automatic control.
Identifiers: Actuators.

Control valves provide the means of providing pressure drops in pipes conveying a process fluid in a process control system. This is done by reducing the cross sectional area of the conduit by mechanical means. This paper describes design characteristics of valves, approaches to valve design, and practical application of control valves. The discussion includes automatic systems in which the valves are operated by actuators. (Mortland-Battelle)
W71-11544

8D. Soil Mechanics

INTERACTIVE GRAPHICS: SETTLEMENT AND SLOPE STABILITY,
Colorado Univ., Boulder.
R. L. Schiffman, and J. R. Stein.
Proceedings, American Society of Civil Engineers, Journal of the Structural Division, Vol 97, No ST1, p 253-272, Jan 1971. 20 p, 14 fig, 19 ref, append.

Descriptors: *Computer applications, *Computer programs, Computers, Computer systems hardware, Computer systems programs, *Consolidation, Slope stability, *Stability analysis, *Settlement (Structural), Soil mechanics, Soil engineering, Stress, Displacements, Soils, Earth dams, Foundations, Embankments, Bibliographies.
Identifiers: *Computer-aided design, Computer-based systems, *Man-machine systems, Display systems, Multilayer soils.

Research and development in the use of interactive computer graphics for soil engineering analysis and design are described. Two specific areas are presented: settlement analysis and slope stability. The systems described were implemented on a CDC 6400 using a CDC 280/282 interactive display system. Three soil engineering application systems are described: (1) Rate INteractive Graphics (RING), a system for predicting the progress of consolidation of multilayered soil deposits; (2) Elastic LAyer STress-INteractive Graphics (ELASTING), a system for determining the stresses and displacements in layered elastic media; and (3) FEllenius-May Analysis-Limiting Equilibrium (FEMALE), a system for analyzing the stability of earth structures using the Fellenius-May technique. An interactive graphics system to provide interactive design for soil engineering is efficient and viable. Some advantages over conventional methods of computer use are: (1) one or more complete designs can be performed at a single sitting at the interactive console, resulting in a shorter design turnaround time; (2) computation costs are substantially lower; (3) visual display of data is possible; and (4) a hard copy suitable for professional use can be produced on microfilm. (USBR)
W71-11149

BEARING CAPACITY OF FOUNDATION PILES: STATE OF THE ART,
Texas A and M Univ., College Station.
H. M. Coyle, and I. H. Sulaiman.
Highway Research Record, No 333, p 87-103, 1970. 17 p, 13 fig, 2 tab, 68 ref, 2 disc.

Descriptors: *Bearing capacity, *Piles (Foundations), Reviews, *Soil properties, *Pile-driving formulas, Pile tests, Cohesionless soils, Cohesive soils, Dynamic loads, Dead loads, Settlement (Structural), Skin friction, Soil strength, Soil tests, Foundations, Field tests, Safety factors, Pore water pressure, Bibliographies, Consolidation.

A state-of-the-art review of bearing capacity of foundation piles is presented. Topics include soil property changes caused by pile driving in cohesionless and cohesive soils, and determination of bearing capacity for single piles and pile groups in cohesionless and cohesive soils. Methods presented for design of single piles include: static formula, dynamic formula, and a recently developed numerical method. The numerical method has been used to predict immediate pile movement under static load as well as ultimate pile load. Methods presented for design of pile groups are empirical in nature and include design against bearing capacity failure and excessive pile and soil settlement. Because this is a state-of-the-art presentation, no definite conclusions are given concerning the use of one design method in preference to another. No single method has been adopted for general use by designers except for field load tests generally used on large construction projects involving pile foundations. (USBR)
W71-11153

STRUCTURES IN SOIL UNDER HIGH LOADS,
Naval Civil Engineering Lab., Port Hueneme, Calif.
J. R. Allgood.
Proceedings, American Society of Civil Engineers, Journal of the Soil Mechanics and Foundations Division, Vol 97, No SM3, p 565-579, Mar 1971. 15 p, 3 fig, 2 tab, 18 ref, 2 append.

Descriptors: *Backfills, *Buried structures, Conduits, Loads (Forces), Cylinders, *Soil mechanics, *Soil properties, Soil structure, Pipelines, Finite element method, Overpressure, Overburden, Soil density, Buckling, Fills, Dynamic loads, Pressure Optimization, Computer programs, Theory, Design practices, Underground structures, Bibliographies.
Identifiers: Blast loads, Experimentation, Soil-structure interaction, Soil arch, Arching.

An overview of the design and analysis of structures in soil for resisting blasts from nuclear or chemical explosions, and the spinoff applications of this technology to civil construction are presented. Basic soil-structure relations are provided for horizontal buried cylinders subjected to high loads. General information is given on the status of soil-structure system optimization and analysis of such systems using finite codes. The main contribution of the paper is a methodology for the design of backpacking over structures. Backpacking is any low modulus material placed in the fill to reduce the effective stiffness of an inclusion with respect to the stiffness of the soil. Factors of 10 or more increase in load capacity of a buried structure can be achieved by proper use of backpacking. (USBR)
W71-11155

FLOW THROUGH ROCKFILL DAM,
H. A. Johnson.
Proceedings, American Society of Civil Engineers, Journal of the Soil Mechanics and Foundations Division, Vol 97, No SM2, p 329-340, Feb 1971. 12 p, 6 fig, 3 tab, 3 ref, 2 append.

Descriptors: *Cofferdams, Dams, *Dam failure, *Rockfill dams, Erosion, Field tests, Fluid flow, Hydraulics, Permeability, Safety, Floods, Flood hydrographs, *Seepage, Soil mechanics, Velocity, California, Flow nets, Laminar flow.
Identifiers: Nonlinear properties.

Occurrence of an extraordinary flood caused large flows through the uncompleted rockfill section of Hell Hole Dam on the Rubicon River, Calif. The partially completed dam was acting as a cofferdam for the construction, and ultimately failed during flow through the rockfill portion. During the flood, observations were made of the reservoir elevations at certain times, and also on 2 occasions, of the elevations at which flow was issuing from the downstream face of the rockfill. Based on the flood hydrograph, computed flow through the diversion tunnel, and the mentioned observations, flows through the rockfill were computed and the equation for nonlinear flow was determined. Results suggest that flow through rockfill can be computed assuming laminar flow, even though flow is not laminar. Comparison is made with published results obtained for flow through rockfill using models. (USBR)
W71-11156

INFLUENCE OF SOIL CONDITIONS ON BUILDING DAMAGE POTENTIAL DURING EARTHQUAKES,
California Univ., Berkeley.
H. B. Seed, and I. M. Idriss.
Proceedings, American Society of Civil Engineers, Journal of the Structural Division, Vol 97, No ST2, p 639-663, Feb 1971. 25 p, 13 fig, 22 ref, 2 append.

Descriptors: *Building codes, Buildings, *Earthquakes, Bibliographies, Foundations, Geologic investigations, *Soil investigations, *Earthquake damage, Soil mechanics, Structural engineering, Building design, Seismic waves, Seismic velocity, *Seismic design, Epicenters, Dynamic response, Lateral forces.
Identifiers: San Andreas Fault, Calif, San Francisco, Calif.

On the basis of ground motions recorded in San Francisco during the 1957 earthquake, ground motion characteristics varied markedly along a 3-mi section of the city, depending on the variation in soil conditions. Building damage potential during earthquakes depends on either the induced/design lateral force ratio or the damage potential index, and variations in these quantities are shown for the 1957 earthquake and for other earthquakes. Variations in soil conditions cause the response of structures to vary by factors ranging from 3 to 6, and the types of soil conditions causing maximum response in different types of earthquakes are discussed. Building codes should reflect the potential variations in damage potential caused by local variations in soil conditions by appropriate variations in design requirements. (USBR)
W71-11158

THERMAL MONITORING OF LEAKAGE THROUGH DAMS,
Occidental College, Los Angeles, Calif. Dept. of Geology; and Geothermal Surveys, Los Angeles, Calif.
J. H. Birman, A. B. Esmilla, and J. B. Indreland.
Supported by Geothermal Surveys. Geological Society of America Bulletin, Vol 82, No 8, p 2261-2284, August 1971. 24 p, 14 fig, 7 tab, 17 ref.

Descriptors: *Earth dams, *Seepage, *Reservoir leakage, *Dam failure, *Monitoring, Instrumentation, California, Dams, Groundwater movement, Saturation, Saturated flow, Piezometers, Safety, Warning systems, Water temperature.
Identifiers: Thermal monitoring, Dam leakage.

Beginning May 1965, a 3 yr temperature study was made in a small earth-fill dam in southern California. The objective was to investigate the capability of thermal sensing methods to detect leakage and to monitor changes in leakage. The dam is 550 ft long, 24 ft high, and impounds a reservoir of 22 acre-ft. Thirty thermistor probes, calibrated to .01 deg C were set 20 ft apart and 7 ft deep along the axis of the dam. Temperatures were recorded at approximately monthly intervals. Indicators of fluid flow are the observed temperature, the differential temperature observed over a time interval, and the parameters of the annual cycle. The observed temperature data could be correlated: (1) with visible leakage zones on the downstream face of the dam; (2) with internal zones of recurrent saturation and with structural conditions, as determined by drillholes and piezometers; and (3) with the total amount of flow through the dam as determined by a water budget study. The method shows good promise as an early warning safety system for dams. (Knapp-USGS)
W71-11208

WATER IN THE UNSATURATED ZONE; PROCEEDINGS OF THE WAGENINGEN SYMPOSIUM.
International Association of Scientific Hydrology, Gentbrugge (Belgium).
For primary bibliographic entry see Field 02G.
W71-11418

SODIUM SILICATE STABILIZATION OF SOILS - A REVIEW OF THE LITERATURE,
Illinois Univ., Urbana.
C. H. Hurley, and T. H. Thornburn.
Civil Engineering Studies, Soil Mechanics Series No. 13, Illinois Cooperative Highway Research Program Series No. 80, February 1971.

Descriptors: *Soil stabilization, *Soil mechanics, *Sodium compounds, *Soil treatment.
Identifiers: *Sodium silicate, *Stabilizer-soil mixtures.

Report consists of an annotated bibliography and summary review of the important literature on the use of sodium silicates in soil stabilization processes. Annotations are given for approximately 90 articles published between 1931 and 1965. On the basis of these articles the authors have summarized pertinent information on stabilizer properties, reaction mechanisms, injection methods of soil solidification, properties of stabilizer-soil mixtures, use of sodium silicates as dustproofers and waterproofers and their use as secondary additives with other stabilizers. Where warrented, conclusions have been drawn regarding the conditions under which sodium silicates appear to have potential value in the soil stabilization field. (WES)
W71-11420

8F. Concrete

FINITE ELEMENT ANALYSIS OF REINFORCED CONCRETE SLABS,
Waterloo Univ. (Ontario).
J. C. Jofriet, and G. M. McNeice.
Proceedings, American Society of Civil Engineers, Journal of the Structural Division, Vol 97, No ST3, p 785-806, Mar 1971. 22 p, 11 fig, 3 tab, 26 ref, 3 append.

Descriptors: Analysis, Bending moments, Bending stress, *Reinforced concrete, Computers, Computer applications, *Computer programs, Plates, Concretes, Cracking, *Finite element method, Flexural strength, Foreign research, *Slabs, Stiffness, *Structural engineering, Bibliographies, Reinforcing steels.
Identifiers: *Concrete slabs.

The bending analysis of reinforced concrete slabs by the finite element method concentrates on the nonlinear behavior caused by progressive cracking of a slab and does not include post-yield behavior. The Branson and Beeby methods are explored for estimating the rigidity of a cracked concrete region. The Beeby method yielded better results. To deal with cracking in any arbitrary direction, suggestions are made for the transformation of the matrix of flexural rigidities and for the determination of equivalent steel areas with respect to the orientation of the cracks in a region. Some results are presented to demonstrate the proposed method. (USBR)
W71-11154

8I. Fisheries Engineering

EFFECT OF JOHN DAY DAM ON DISSOLVED NITROGEN CONCENTRATIONS AND SALMON IN THE COLUMBIA RIVER, 1968,
Bureau of Commercial Fisheries, Seattle, Wash.
Kirk T. Beiningen, and Wesley J. Ebel.
Transactions of the American Fisheries Society, Vol 99, No 4, p 664-671, 1970. 7 fig, 5 ref.

Descriptors: *Anadromous fish, *Dams, *Nitrogen, *Supersaturation, Mortality, Rainbow trout, Salmon, Diseases, Migration, Temperature, Spillways.
Identifiers: *Dissolved nitrogen, Columbia River (Wash), John Day Dam (Wash), Gas bubble disease.

Analyses of Columbia River water above and below the newly-constructed John Day Dam revealed that the heavy spillway discharge produced a 123% to 143% supersaturation of water with dissolved nitrogen. This alteration of the habitat as well as the dam-delayed passage of fish induced incidence of gas bubble disease and mortality of juvenile and adult salmon, Oncorhynchus sp, and steelhead trout, Salmo gairdneri. Operation of some turbines prior to the filling of the reservoir is recommended as a measure precluding a heavy spillway and the oversaturation of water with dissolved nitrogen. (Wilde-Wisconsin)
W71-11018

EFFECT OF WATER VELOCITY ON THE FISH-GUIDING EFFICIENCY OF AN ELECTRICAL GUIDING SYSTEM,
Bureau of Commercial Fisheries, Seattle, Wash. Seattle Biological Lab.
John R. Pugh, Gerald E. Monan, and Jim R. Smith.
Fishery Bulletin, Vol 68, No 2, p 307-324, Jun 1970. 18 p, 16 fig, 6 tab, 8 ref.

Descriptors: *Fish Guiding, *Fish migration, *Electrical shocking gear, *Streamflow, *Velocity, Salmon, Trout, Washington, Model studies, Analytical techniques, Methodology, Fish management, Chinook salmon, Rainbow trout, Fish passages, Trapping, Environmental effects.
Identifiers: *Coho salmon, *Steelhead trout.

A study of guiding fish with electricity and water velocity techniques was performed in a diversion of the Yakima River near Prosser, Washington. Massive structures for regulating the water velocity, producing the desired electrical field, and collecting the guided fish were installed. Evaluation facilities consisted of rotary drum screens to divert all fish that escaped past the electrical field to an inclined-screen trap. The fish tested were wild, downstream-migrating fingerlings of chinook salmon, Oncorphynchus tshawytscha; coho salmon, O.kisutch; and rainbow or steelhead trout, Salmo gairdneri. The variables were three water velocities, three species, and four test periods. Fish-guiding efficiency tended to decrease with increasing water velocity. The guiding efficiencies of the electrical system at water velocities of 0.2, 0.5, and 0.8 (m.p.s.) meter per second were, respectively, 84.2, 54.2, and 50.2 percent for chinook salmon; 82.4; 47.8, and 42.8 percent for coho salmon; and 69.9, 40.2 and 44.8 percent for rainbow or steelhead trout. The guiding efficiency achieved was, thus, highest with chinook salmon, intermediate with coho salmon, and generally lowest with rainbow or steelhead trout. (Woodard-USGS)
W71-11357

09. MANPOWER, GRANTS AND FACILITIES

9C. Research Facilities

A WATER HARDENER FOR EXPERIMENTAL USE,
National Water Quality Lab., Duluth, Minn.
Armond E. Lemke.
Journal of the American Water Works Association, Vol 61, No 8, p 415-416, August 1969. 1 fig, 3 ref.

Descriptors: *Water quality, *Laboratory equipment, *Facilities, *Hardness (Water), Bioassay, Research facilities, Calcium, Calcium carbonate, Research equipment, Automatic control, Plumbing, Water pollution effects, Water properties.
Identifiers: *Laboratory facilities, Water hardening.

A method of increasing the hardness of Lake Superior water (normally 42 mg/l as $CaCO_3$) was required for bioassay work conducted by the National Water Quality Laboratory in Duluth, Minnesota. Hardness was increased by passing water through a limestone-filled tank through which CO_2 was bubbled. Details of the system are provided. Performance of the equipment has been very good with plus or minus 5% being maintained 90% of the time, and plus or minus 10% exceeded only when part of the system malfunctioned. Only light maintenance is required. (LeGore-Washington)
W71-11047

10. SCIENTIFIC AND TECHNICAL INFORMATION

INFORMATION FOR URBAN AFFAIRS IN CANADA,
Canadian Council on Urban and Regional Research.
For primary bibliographic entry see Field 06B.
W71-10972

THE CPA'S ROLE IN RESTORING THE ECONOMICAL BALANCE,
Price Waterhouse and Co, Philadelphia, Pa.
For primary bibliographic entry see Field 07B.
W71-11157

BIBLIOGRAPHY OF TRITIUM STUDIES RELATED TO HYDROLOGY THROUGH 1966,
Geological Survey, Albany, N.Y.; and Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W71-11254

GAS CHROMATOGRAPHY: TECHNIQUES AND USES IN SOIL, PLANT, AND WATER ANALYSIS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 02K.
W71-11410

ENVIRONMENTAL ASPECTS OF MERCURY USAGE.
Dow Chemical Corp., Midland, Mich.
For primary bibliographic entry see Field 05C.
W71-11417

SODIUM SILICATE STABILIZATION OF SOILS - A REVIEW OF THE LITERATURE,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 08D.
W71-11420

THE STATE OF KNOWLEDGE WITH REGARD TO THE EFFECTS OF PHYSICAL AND CHEMICAL ENVIRONMENTAL CONDITIONS ON MARINE BIOTA WITH EMPHASIS ON THE LONG ISLAND SITUATION.
New York Ocean Science Lab., Montauk. Center for the Environment of Man.
For primary bibliographic entry see Field 05C.
W71-11466

THE STATE OF KNOWLEDGE WITH REGARD TO THE EFFECTS OF PHYSICAL, CHEMICAL AND BIOLOGICAL CONDITIONS ON THE USES OF COASTAL RESOURCES.
New York Ocean Science Lab., Montauk. Center for the Environment of Man.
For primary bibliographic entry see Field 05C.
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A BILL TO AMEND THE ACT OF AUGUST 1, 1958, TO AUTHORIZE RESTRICTIONS AND PROHIBITIONS ON THE USE OF INSECTICIDES, HERBICIDES, FUNGICIDES, AND PESTICIDES WHICH POLLUTE THE NAVIGABLE WATERS OF THE UNITED STATES.
W71-11185 06E

A BILL TO PROHIBIT THE DISCHARGE INTO ANY OF THE NAVIGABLE WATERS OF THE UNITED STATES OR INTO INTERNATIONAL WATERS OF ANY MILITARY MATERIAL OR OTHER REFUSE WITHOUT A CERTIFICATION BY THE ENVIRONMENTAL PROTECTION AGENCY APPROVING SUCH DISCHARGE.
W71-11186 06E

A BILL TO AMEND THE ACT OF JUNE 29, 1888, RELATING TO THE PREVENTION OF OBSTRUCTIVE AND INJURIOUS DEPOSITS IN THE HARBOR OF NEW YORK, TO PROVIDE FOR THE TERMINATION OF CERTAIN LICENSES AND PERMITS.
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources management at the Center for Urban Studies of the University of Chicago.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Research Institute of Rutgers University.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the EPA-Water Quality Office, Soap and Detergent Association, and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.

Supported by the Environmental Protection Agency in cooperation with WRSIC.

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Textile wastes pollution at the School of Textiles of North Carolina State University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Agricultural livestock wastes at the Department of Agricultural Engineering of Iowa State University.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Water Quality Office of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association Research Foundation.

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